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**AN EXPLORATION OF MEDIATION IN AN INTERVENTION
PROGRAMME FOR EDUCATIONALLY DISADVANTAGED
MEDICAL STUDENTS.**

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**A dissertation submitted in fulfillment of the requirements for the award
of the degree of Master of Education**

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COMPULSORY DECLARATION

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature: signature removed Date: 23/03/08

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ABSTRACT

In South Africa the demand for access in tertiary education is increasing. Since 1994 transformation has occurred at most tertiary institutions, offering previously educationally disadvantaged students opportunities to engage successfully with their studies by implementing support structures to ensure academic development. Compounding this, the demand for universities to produce competent doctors, who can meet the health needs of South Africa, has also increased. Faculties of Health Sciences are facing the challenge of offering a diverse student population opportunities to pursue a MBChB qualification. In response to this challenge, the Faculty of Health Sciences at the University of Cape Town introduced a transformed medical curriculum in 2002. Students meeting entrance criteria entered as a single cohort, with an academic development programme taking the form of an intervention to address unsatisfactory performance at the end of semester 1. This thesis explores the academic and cognitive difficulties that educationally disadvantaged first year medical students experienced prior to the Intervention Programme and the role of mediation in the programme to address underachievement by providing the necessary academic building blocks for students to return to mainstream.

This study draws on the theories of Vygotsky and Feuerstein to investigate how mediation can be studied in an academic development programme, using a collective case study with qualitative and quantitative research methods. In a bid to elucidate the role of mediation in improving learner outcomes in this programme, the study uses an error analysis to investigate underlying cognitive difficulties experienced by participants in a mainstream exam preceding their entrance into the programme. This part of the research is followed by developing a language of description with which to analyse the practice of three Intervention Programme staff members, in order to understand how mediation functions to impact on students' performance. To this end a methodology, capable of tracking mediation in observation data, is elaborated and discussed.

It was found that the participants selected for the study demonstrated "at risk" academic behaviour and would therefore benefit from a scaffolded intervention programme. Comparing results from the error analysis with existing cognitive

categories elucidated that participants experienced a range of underlying cognitive difficulties when engaging with assessment material. In addressing these difficulties, it was found that mediation is used by lecturers in the Intervention Programme to foster reciprocity, meaning and transcendence, which in return assisted students developmentally. Comments from participants during interviews confirmed that students perceive the learning activities of Intervention Programme to be beneficial. Pre- and post-test results from standardised cognitive measures indicated that participants shifted cognitively and academically after six months in the Intervention Programme. The study concludes that mediation plays a significant role in strengthening cognitive and academic skills necessary for successful performance in a first year MBChB course. To constructively address the legacy of apartheid, higher education institutions need to gain insight into the academic challenges facing educationally disadvantaged students. The contribution of this thesis is a framework for exploring how mediation in an academic development programme can address these academic challenges.

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CHAPTER ONE

INTRODUCTION

1.1. ELUCIDATING THE CONTEXT

There is proverb that says, “each small candle lights a corner of the dark”. Many researchers have shed light on the phenomena that I have explored in the thesis. Thus the knowledge and understanding gained through the research process forms part of a much bigger picture to elucidate the process of mediating educationally disadvantaged students to reach their full academic potential.

This thesis drew on literature from three contexts in order to formulate the research question: the impact of apartheid on academic performance at tertiary level, transformation in medical education and the role of mediation in an intervention programme to facilitate the process of knowledge construction.

The impact of apartheid on academic performance at tertiary level

An enduring consequence of apartheid is that students are not sufficiently prepared for the demands of tertiary education. Students from educationally disadvantaged backgrounds were often selected into courses, creating expectations that they would be able to meet the demands of an academic culture that had values and norms that were not always familiar. Since 1980 transformation started to occur at tertiary institutions, offering educationally disadvantaged students more opportunities to successfully complete their studies. Through the process of transformation universities have therefore been challenged to widen access and implement support structures to ensure the academic development of educationally disadvantaged students. Academic support initiatives at South African universities differ considerably; however the overall purpose and outcome of all these programmes are to support students from educationally disadvantaged backgrounds to adjust to the demands of higher education. From the literature discussed in Chapter Three, it appears that not many studies explore tangible ways in which to facilitate academic shifts. Studies would typically describe academic support programmes, and show results to indicate that the initiatives

have been successful, but not suggest a framework to investigate why and how students can become better equipped to deal with the academic and cognitive demands of the courses. To constructively address the legacy of apartheid, higher education institutions need to gain thorough insight into the academic challenges facing educationally disadvantaged students. Once there is a better understanding of the difficulties experienced by students, scaffolding activities can be designed and implemented to enable students to engage successfully with their studies.

Transformation in medical education

The demand for adequately trained doctors has resulted in the transformation of MBChB curricula.¹ Health Science institutions have to produce qualified and able health practitioners to address the specific health needs of our country. In order to achieve this objective, many Health Science institutions have opted for a problem-based curriculum to develop students into self-directed learners who can meet the challenges of under-resourced working conditions (see Chapter Three). Recent guidelines for transformation in MBChB curricula stipulated that medical students are expected to become self-directed learners who have acquired the skills and abilities to sift and sort through vast amounts of knowledge in order to identify a specific problem and to subsequently apply their knowledge to address and “solve” the problem. These guidelines will be discussed in more detail in Chapter Three. First year medical students from educationally disadvantaged backgrounds therefore face a particular challenge; they are expected to develop into self-directed, lifelong learners by adapting to a problem-based curriculum, whilst facing academic difficulties remnant from the historical and political context of South Africa.

¹ MBChB stands for Bachelor of Medicine and Bachelor of Surgery. After successful completion of the degree, an internship and a further year of community service, students qualify to register as medical doctors.

The role of mediation in an Intervention Programme

According to the literature, unsuccessful performance of educationally disadvantaged students in South Africa can be explained as a result of inappropriate mediated learning experiences, rather than the intellectual properties of the individual student (Mehl, 1991). The dissertation explored the role of mediation in an intervention programme for first year medical students. This programme, the Intervention Programme (IP), consists of two parts: part one addresses the foundational building blocks of disciplines by revisiting core concepts covered in the mainstream semester one course, and part two consists of a forward looking component where students are introduced to new material and a range of generic skills. The overall aim of the Intervention Programme is to address learning obstacles that have obstructed students' academic achievement in the semester one mainstream course. At the end of the programme the expectation is that students will be better prepared and equipped for achieving academic success and that they will be able to transfer and implement skills, knowledge and attitudes to other study areas (Alexander, Badenhorst & Gibbs, 2005). The overall aim of the dissertation was therefore to analyse how learning and teaching activities in this programme make use of mediation to address underachievement.

1.2. RATIONALE

In 2002 the Faculty of Health Sciences at the University of Cape Town (UCT) embarked on a transformed curriculum. One of its aims was to establish an academic support programme for educationally disadvantaged students that was not moulded on the same principles as a previous deficit model, where students were labelled and stigmatised, even before they entered the MBChB course. In the new curriculum all successful applicants enter as a single cohort. If students fail the first semester, they enter the Intervention Programme. A detailed description of the programme will be given at the end of Chapter Two.

In 2002 my responsibility was to oversee the design, implementation and management of this newly conceptualised Intervention Programme. Through this

work I came into contact with many discouraged first year MBChB students who experienced learning difficulties during their first semester. All these students had one thing in common. They came from educationally disadvantaged backgrounds and were not academically prepared to thrive in a tertiary environment. As top students of their schools, their families, teachers and friends all believed that these students would continue to perform as well as they did during their schooling years.

In speaking to the students and teaching staff, it seemed that the students had difficulty accessing prior knowledge and foundational concepts to construct the type of knowledge required in an academic context. Drawing on the expertise of staff from the Centre of Higher Education Development (CHED), students' scripts were analysed after every assessment they wrote during the first semester. It transpired that students did not apply the necessary academic literacy skills to articulate their knowledge. They also expressed difficulty in optimising the problem-based teaching and learning methodologies used in the MBChB course. These students struggled to come to grips with the very specific academic culture of a university.

During semester one of 2002, all "struggling" students were carefully monitored, and all learning difficulties were recorded. Based on this information, the Intervention Programme was designed. Students who failed semester one entered the Intervention Programme in June. At this stage I did not work from a specific theoretical framework, and operated mostly on "gut responses" to address academic difficulties during support activities in the Intervention Programme. It soon became apparent that some students started to benefit tremendously from scaffolded, structured learning activities. Students commented on how tutorials and lectures in the Intervention Programme enabled them to access learning materials; for example, how to use textbooks, lecture notes and worksheets. These learning activities clarified concepts for them, and made it clear how teaching methodologies linked to broader learning objectives. Typically students were prompted in the learning activities to first develop a proper understanding of

concepts by going back to the fundamental building blocks of the concepts. Using worksheets during small group tutorials, students were then guided to identify and formulate the task at hand and helped to apply their new knowledge in written tasks. Students were given continuous formative feedback during the learning activities so that they were able to understand how foundational concepts would benefit them when they encountered more complex material. An example of formative feedback would be to explain why students needed to become familiar with “normal development” in order to understand the concept of “pathology”. Students were also actively made aware of ways in which they could transfer their skills to other areas. During academic literacy activities, for example, they were shown how reading and writing skills could be transferred to other disciplines. In course evaluations students noted that their interaction with the Intervention Programme course and staff enabled and motivated them to construct their own knowledge, as they were beginning to understand the intentionality and meaning of teaching and learning activities in the curriculum.

The Intervention Programme has been running for five years, and anecdotal evidence suggests that the students who made use of structured, scaffolded activities are coping academically in mainstream. Literature on the legacy of apartheid and subsequent educational transformation in South Africa made me aware that the students who entered the Intervention Programme did not *lack* the necessary cognitive abilities and skills to perform successfully at a tertiary level, but that certain cognitive and metacognitive processes needed to be mobilised and strengthened to enable them to engage successfully with higher education. In trying to find an explanation and theoretical framework for the dramatic academic improvement that occurs during the Intervention Programme, I began reading the theories of Vygotsky and Feuerstein on mediation and the zone of proximal development. These theories are discussed in more detail in Chapter Two. It became clear to me that the basis of teaching activities in the programme contained similar elements of mediation, enabling students to move closer to their full academic potential. I became interested in what it was in the programme that enabled students to continue successfully with their studies. This study has

therefore drawn on three concepts: academic and cognitive difficulties experienced by educationally disadvantaged students when they have to construct Health Science knowledge at a first year level, the role of mediation during teaching and learning activities and the zone of proximal development. These concepts will be outlined in Chapter Three. The next section will outline the process of formulating the research question in more detail.

1.3. RESEARCH QUESTION

Drawing on my experience in designing, implementing and monitoring the Intervention Programme, and the mediation theories of Feuerstein and Vygotsky, I embarked on the study to investigate how the teaching and learning activities in the Intervention Programme facilitate access to academia. I decided on a descriptive study rather than an evaluative study in order to observe and describe the activities in detail and to monitor any changes in students' academic behaviour. This became the broad focus of the dissertation, with underlying sub-questions, which led me to a deeper understanding of the role of mediation in the programme.

In order to gain a good understanding of challenges facing the students, I also consulted literature on the cognitive demands specific to a medical curriculum. A more detailed description of the literature focusing on transformation in medical education can be found in Chapter Three. As mentioned before, the students who enter the Intervention Programme came mainly from educationally disadvantaged backgrounds and appeared to be underprepared to meet the academic demands of accessing the correct knowledge from a body of information, to process the information constructively and to formulate a coherent and logical response to address the problem. I therefore decided to explore the underlying reasons for their underachievement in mainstream assessment activities by analysing the typical errors they made and linking these errors with similar descriptions in existing theories and proven studies.

Once I had a better understanding of the academic and cognitive challenges that hampered students' performance, I observed learning and teaching activities in the Intervention Programme to gain insight into methods and approaches used by lecturers to address academic difficulties. For this part of the study I consulted the theories of Vygotsky and Feuerstein to explore how mediation can enable students to reach their academic potential. Drawing on their theories, the dissertation used a collective case study to establish whether all lecturers used the same underlying principles of mediation in different teaching and learning activities, or whether mediation happened in isolated instances.

Based on the mediation theories of Feuerstein and Vygotsky, students were supposed to develop and strengthen their cognitive skills, and move closer to their actual level of potential after a period of intensive mediation. Although this was not an evaluative study, I chose qualitative and quantitative measurements to investigate whether any academic and cognitive shifts occurred after the Intervention Programme. The overall aim of the Intervention Programme is to equip students with knowledge, skills and attitudes in order for them to stand a better chance in performing successfully once they return to mainstream. I was therefore interested in exploring whether the learning and teaching activities in the programme did indeed shift students academically.

Lastly I wanted to explore how students viewed the programme, and whether I could find evidence of metacognition in their comments and evaluation of the programme. Interviews were used to explore whether students perceived the programme to develop and strengthen academic abilities.

1.3.1. THE OVERALL RESEARCH QUESTION

The overall research question therefore became:

How does an Intervention Programme mediate knowledge to educationally disadvantaged medical students?

1.3.2. SUB-QUESTIONS THAT GUIDED THE COLLECTION AND ANALYSIS OF THE DATA:

- In what ways do educationally disadvantaged students demonstrate academic “at risk” behaviour?
- How does the Intervention Programme scaffold learning activities?
- How do students view the role of the Intervention Programme in strengthening their academic performance?
- Does mediation in the Intervention Programme lead to a shift in test performance and shift students academically?

1.4. AIMS

Mecer and Fischer (in Verenikina, 2003) propose that a scaffolded teaching and learning event should have three components. Firstly, the activity should enable students to carry out the task, which they previously were not able to complete on their own. Secondly, the learners should be brought to a point of competence, which will enable them to eventually access the right information, process it successfully and apply their knowledge in a constructive way to solve the problem on their own. Thirdly, there should be evidence to show learners have achieved a greater level of independent competence as a result of the scaffolding. The aim of the dissertation was therefore to analyse data qualitatively in order to ascertain whether this was indeed the case.

1.5. METHODOLOGY

In order to achieve the aim of the study, a descriptive study design consisting of two parts was chosen to collect and analyse data. Part one focussed on identifying and analysing typical errors made by students who were unsuccessful in the June exam and subsequently entered the Intervention Programme, and part two consisted of the observation of three different teaching and learning situations in the Intervention Programme. In addition, interviews were conducted to explore students’ experiences of the programme. In order to limited bias, interviews were transcribed, reflecting the actual words used by students. Grammatical and semantic errors were therefore not corrected.

Three Intervention Programme lecturers and ten students participated in this study. The lecturers were approached because of their involvement in specific teaching and learning activities. Criteria for selecting these activities are described in detail in Chapter Four. The ten students all failed the semester one course and entered the Intervention Programme in July 2006.

All participants were asked to sign an informed consent that included permission to record the teaching and learning sessions, completion of cognitive tasks, interviews, analysing of scores and demographic profiles. An example of the consent form can be found in Appendix II. Every effort was made to safeguard the anonymity and to protect the identity of each student and staff member. Data were stored in a safe place and lecturers and students were informed of how data were collected and analysed. To safeguard the participants' identities, data were viewed and analysed by the investigator only, except, where necessary, by the supervisor for academic advice or verification of the transcription. Transcription was done using pseudonyms for the participants. The electronically recorded data were kept in a secure place by the investigator for the duration of the study in order to respond to queries.

The students and lecturers were informed in writing about the purpose of the investigation. When soliciting participants, it was emphasised that agreeing to or declining to take part in this project would not influence (positively or negatively) their standing, reputation or assessment in the Intervention Programme. Participants were free to withdraw from the study at any point without any consequences.

The overall research was based on a collective case study in order to elucidate patterns. Data collection and analysis were executed by using an error analysis, observation and interviews. The study followed an inductive and deductive approach to analyse the results. Quantitative and qualitative analysis were used in order to answer the sub-questions. Drawing on the theories of Feuerstein and Vygotsky, results from the data analysis were linked to a theoretical framework of

mediation. To ensure reliability and validity, four types of triangulation were applied. A detailed discussion of the research methodology is given in Chapter Four. Results from the data analysis are outlined in Chapters Five and Six.

The value of exploring a Social Science paradigm through the means of qualitative research lies in the journey that will lead to context-imbedded knowledge. Flyvbjerg (2006) advises researchers to use this process, not in the hope of proving anything, but rather in the hope of learning something. The dissertation therefore did not set out to uncover universal truth, but rather explored a micro educational setting in order to gain a better understanding of the concept of mediation against the backdrop of medical education and educational transformation in South Africa.

1.6. OUTLINE

Chapter One focuses on the research question, the rationale and aim of the study. The purpose of this chapter is to rationalise the reason for investigating mediation in a South African higher education milieu. All research has key concepts around which the study is built; so the key concepts used in the dissertation are defined and explained in Chapter Two. Chapter Two forms the theoretical framework of the dissertation where the mediation theories of Vygotsky and Feuerstein are discussed in detail. A brief overview of the Intervention Programme is also given in order to begin to understand how the theoretical framework resonates with the programme. Chapter Three reviews the literature consulted for the dissertation. The literature review starts with an overview of educational transformation in South Africa and the consequences of apartheid, followed by an overview of ways in which tertiary institutions are addressing problems experienced by educationally disadvantaged students. In order to become familiar with the specific challenges facing first year medical students, an overview of literature on medical education is also given. Current studies on mediation are reviewed in order to gain insight into the role and impact of this approach to teaching and learning. The research design and methodology used in the dissertation are discussed in Chapter Four. This study used an inductive and deductive approach

to collect and analyse data, so the research instruments, sample design and data collection process chosen for the study are explained and discussed. In Chapter Four a conceptual map of the research process is given to illustrate how error analysis, observations and interviews were used to gain insight into students' zone of proximal development. In Chapter Five results from the error analysis and pre- and post- tests are discussed to explore the impact of the Intervention Programme on academic achievement. Findings from a quantitative analysis provide the basis for a qualitative investigation into how mediation, which is theorised as the driving force for learning in this dissertation, affects academic shifts. Chapter Six therefore explores to what extent the Intervention Programme incorporates mediation as a pedagogical strategy. In Chapter Seven, salient points, such as cognitive difficulties and mediation, are discussed and a logical chain of evidence is presented to link findings, theory and literature. This chapter discusses how mediation, as a developmental strategy, provides a strong explanation for why students' academic engagement improved over the course of the programme. In this chapter the limitations of the study are highlighted and recommendations for further studies are suggested.

1.7. IN SUMMATION

Past imbalances in South Africa have resulted in a large part of the population being educationally disadvantaged. According to the literature, unsuccessful performance of educationally disadvantaged students in South Africa can be explained as a result of inadequate mediated learning experiences, rather than the intellectual properties of the individual student. Designing a study to research the role of mediation is therefore relevant to the South African educational context, because it can contribute to shedding light on the impact of our chequered history of inequality, and suggest constructive ways to address underachievement. I believe that my dissertation provides a relevant, detailed exploration of challenges facing first year medical students, as well as an in-depth framework for studying the role of mediation in teaching and learning activities in an intervention programme

CHAPTER TWO

TOWARDS A THEORETICAL FRAMEWORK

2.1. INTRODUCTION

This chapter consists of three parts; beginning with a definition of central themes in order to orientate the reader, followed by an outline of the theoretical framework used in the dissertation. The last part of the chapter outlines the Intervention Programme and draws links between the theoretical framework of the dissertation and the aims and objectives of the programme.

2.2. DEFINITIONS OF CENTRAL THEMES

Below five key concepts are clarified to indicate how they were interpreted and applied to demarcate the research area.

2.2.1. Educationally disadvantaged students

The concept “educationally disadvantaged” signifies that students were exposed to a background of educational oppression, resulting in an inability to engage successfully with the academic demands of higher education. Yeld (2001) argues that although the notion of “educationally disadvantaged” is sensitive within the South African context, it has become generally a more acceptable term to use when referring to the “outcomes of the long-term under-resourcing, mismanagement, and deliberate oppression of the system designed in the years of apartheid to cater for the educational needs and aspirations of black learners” (pg 49). Hofmeyr and Spence (cited in Yeld, 2001) agree that the term “educationally disadvantaged” has become a more acceptable term compared to the 1980s when students were labelled as “cognitively deficient”. In the context of this dissertation the term “educationally disadvantaged” is applied when referring to the conceptual understanding of students who entered the Intervention Programme as a result of underachievement.

2.2.2. “At risk” students and Academic Underachievement

The dissertation refers to “at risk” students as students who are demonstrating academic performance that could hamper their progress in a mainstream course. This could either manifest in unsuccessful performance and underachievement during mainstream assessment activities, or be derived from matriculation results and scores from cognitive measures, such as placement tests used by the Faculty of Health Sciences. It is important to note that this concept does not refer to students’ actual abilities. Mosito (2006) explains that the reasons for underachievement can be found in the fact that students have not undergone cognitive change yet. She defines academic underachievement as students’ performance on tasks that “is below their expected capabilities” (pg 11). As a result of underachievement these students become academically “at risk”.

2.2.3. To scaffold

The dissertation refers to scaffolding as a structured way in which learning activities in the Intervention Programme are designed and implemented to gradually teach students to become competent in carrying out a specific task.

Scaffolding is an organized process by which someone organizes an event that is unfamiliar or beyond a learner's ability in order to assist the learner in carrying out that event. Learners are encouraged to carry out parts of tasks that are within their ability, and the adult "fills in" or "scaffolds" the rest. The scaffolding involves recruiting the learners interest, reducing their choices, maintaining their goal orientation, highlighting critical aspects of the task, controlling their frustration, and demonstrating activity paths to them (Wood, Bruner & Ross, 1976, pg 91).

2.2.4. Construction of Knowledge

Construction of knowledge will be explored in the next section by drawing on Feuerstein and Vygotsky’s theories. In the broader context of the dissertation this term will be used in conjunction with strategies that can be followed to equip students “to become better mental managers, engaging in more conscious and crafted thinking to make the most of their cognitive resources” (Perkins, Simmons & Tishman, 1990, pg 286). The construction of knowledge will be explored as a two-fold process, where the first part involves the first level of cognitive processing, such as memorizing, reading, perceiving and acquiring language. This

is when the student engages in various cognitive tasks. The second level, metacognition, is defined as “the processes which are invoked to monitor cognitive progress when an individual is engaged in level 1 cognitive tasks or goals” (Strohm Kitchener, 1983, pg 225).

2.2.5. Mediation

This concept of mediation will be explored in detail in the next section. The term is used to refer to a deliberate intervention in the learning process to enable the student to gain knowledge and skills.

2.3. THEORETICAL FRAMEWORK

In order to lay a foundation for the questions asked in the dissertation, this part of the chapter explores cognitive development and the mediation theories of Vygotsky and Feuerstein. Vygotsky’s (1978) mediation theory was selected for the dissertation since a parallel can be drawn between his understanding of the construction of knowledge and the aims of the teaching and learning strategies of the Intervention Programme. Vygotsky’s notion that learning is a social process dependent on the interaction between a mediator, learning tools and the learner, provides a conceptual and constructive lens to explore the theoretical framework of the programme. However, in order to operationalise the process of mediation, Feuerstein’s theory (Feuerstein & Feuerstein, 1991) provides a more concrete language of description for mobilising this term in research. Feuerstein’s work is useful to this theoretical framework for two reasons: his own context of working with people from heterogeneous backgrounds is not unlike the context faced in this study, and secondly, his operationalisation of mediation provides a basis for the development of an analytical framework with which to interrogate observational data.

2.3.1. Overview of cognitive development and construction of knowledge

Cognitive development is not only restricted to the construction of knowledge during childhood, but plays a key role in the construction of new knowledge in adult learners.

Piaget (1955, 1983) initially elaborated the concept of cognitive development. His theory is often referred to as Cognitive Constructivism as the core of the theory centres around the child actively making sense of his/her world. Unlike theories describing cognitive development as the unfolding of intrinsic knowledge and abilities, or the gradual acquisition of knowledge through experience, Piagetian theory views people as actively involved in constructing their cognitive structures through self motivation and a process of equilibration (Piaget, 1983). While Piaget's theory views the learner as an active participant in knowledge construction, it does not adequately account for the role that socio-cultural structures play in the development of cognition. Vygotsky, another theorist who played a key role in describing the development of cognition, has social construction of knowledge as one of the central components of his theory.

Vygotsky (Kozulin, 1990; Moll, 1990; Van der Veer & Valsiner, 1991; Vygotsky, 1978) believes in the social construction of knowledge as opposed to learning being solely an internal process. He argues that one should explore the relationship between learning and cognitive development to understand the construction of knowledge. Vygotsky makes a strong case that the development of cognitive functioning does not determine the quality of the learning experience. In other words the developmental processes do not coincide with learning processes as was argued by Piaget. The Vygotskian child is therefore not the Piagetian epistemic subject, independently constructing knowledge as he/she 'transacts' with his/her environment. The child in Vygotsky's theory requires guidance; his/her activity must be directed by a cultural regulator. Central to Vygotsky's thesis is the notion that the individual's interaction with objects in the world is mediated by cultural artefacts: signs, symbols and practical tools. Artefacts carry with them a history of use and are themselves altered, shaped and transformed when used in activities (Bannon & Bodker, 1991).

2.3.2. The zone of proximal development (ZPD)

Vygotsky states that the developmental process in children lags behind the learning process and that ‘learning creates ... the zone of proximal development’ (Vygotsky, 1978, pg 90). Vygotsky defines the zone of proximal development (ZPD) as

the distance between the actual development as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978, pg 86).

According to Vygotsky (1978), the ZPD refers to the place where cognitive functions are in the process of maturation. In order for people to move from their actual development to potential development, they need to be guided by a culturally more developed peer or teacher to acquire higher cognitive functions. Higher cognitive functions are not biological, but of a more complex cultural nature, such as problem-solving, mathematical reasoning, reading and writing (Boyd, 2000; Moll, 1990; Vygotsky, 1978).

Within this zone the child acts with the aid of an ‘other’ in order to understand and solve problems that he/she cannot solve unaided. This allows for a view of pedagogy as guided assistance (Tharp & Gallimore, 1988). Mosito (2006) stresses the significance of guided assistance to ensure that cognitive development occurs in the ZPD. According to her the role of the mediator is crucial in the case of learners who have not had opportunities to optimally prepare themselves for formal education. The process that facilitates and allows for the move from actual development to potential development in the zone of proximal development is therefore referred to as mediation (Vygotsky, 1978), and the person who is responsible for the guided assistance is the mediator. Through mediated action the learner comes to understand (Wertsch, 1991). Chapter Six will outline how the data in this study were analysed to explore whether mediation played a role in opening the participants’ zone of proximal development.

2.3.3. The role of human and symbolic mediators in cognitive development

A central premise of mediation is that a learner can accomplish more with assistance than he/she can on his/her own.

Figure 2.1: Mediation of higher cognitive functions

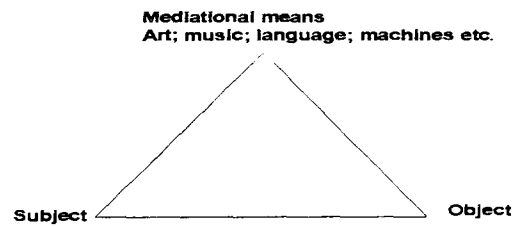


Figure 2.1 illustrates how a human interacts with the world by means of cultural artefacts. The world is never approached directly in the course of the development of higher cognitive functions but is always mediated (Bateson, 1972; Wertsch, 1991). That is, the natural relationships represented at the base of the triangle become subsumed by cultural relationships represented at the apex of the triangle (Davydov, 1999). Hardman and Ng'ambi (2003) did research to investigate the role of mediation and scaffolding in addressing underachievement of students registered for a B Ed honours degree at the University of Cape Town. In their research they drew on models for mediation, specifically on Vygotsky's concept of mediation, which infers that knowledge is constructed through the use of mediated means. They explored the theoretical underpinnings for a computer-based project that was designed in 2002 to facilitate learners' access to academic text by scaffolding their questioning engagement with the text. Hardman and Ng'ambi (2003) discuss how an understanding of the ZPD can direct a teacher to specific interventions. An important factor identified by the researchers, and relevant to the current study, is the use of questions in mediation. Hardman and Ng'ambi point out that asking questions is a valuable tool that teachers can apply to understand the gap between what the learner knows and needs to know.

Kozulin (2002, 1991) describes two angles to mediation: human mediation and symbolic mediation. Vygotsky (Kozulin, 1990; Moll, 1990; Van der Veer & Valsiner, 1991; Vygotsky, 1978) theorises that each psychological function appears twice in a child's development. The first is actual interaction between people; whilst the second is when the child internalised this interaction into his/her own psychological functions. In order for cognitive development to occur in the ZPD, Vygotsky emphasises the importance of symbolic and human mediators, so that the child will find it easier when he/she internalises the mediated interaction into his/her psychological functions.

Vygotsky (Kozulin, 1990; Moll, 1990; Van der Veer & Valsiner, 1991; Vygotsky, 1978) argues that cognitive development and learning depends on a child's mastery of symbolic tools. Language, mathematics, music notation and maps can be classified as symbolic mediators. The acquisition of these symbolic tools depends on human mediators and does not appear spontaneously. Symbols may be useless unless their meaning as cognitive tools is properly mediated to the child. The mere availability of signs or text does not imply students will use them as psychological tools (Vygotsky in Kozulin, 2002).

A study carried out by Vygotsky and Luria (Luria, 1976) has shown that literacy acquired in nominally formal educational settings does not necessarily lead to cognitive changes, unless mediated to students as cognitive tools. Studies by Kozulin (2002) with immigrant adults from Ethiopia demonstrated that students' ability to read and write in their own language did not influence their ability to solve problems. Kozulin surmises that literacy and numeracy were taught to these students as technical skills. Students did not see the importance of and reason to decode, memorise, reproduce or perform calculations. In their minds literacy and numeracy remained separate technical skills devoid of wider cognitive importance. In order for symbolic tools to have proper educational value, students should be introduced to them in a systematic manner by a human mediator. If tools are not mediated, the student will simply view them as another content item. As a result, students will be unable to identify the instrumental part of the learning

material. Symbolic mediators therefore have the capacity to become cognitive tools through proper human mediation.

The notion that a human mediator is necessary for cognitive development is central to this dissertation. Chapter Six will outline how explicit mediating techniques were used by mediators to enable students access to symbolic tools such as mindmaps and text.

2.3.4. Spontaneous and scientific concepts

According to Vygotsky (1978) content learning can be classified into two different conceptual processes: formation of spontaneous concepts, and development of scientific concepts. The formation of spontaneous concepts refers to the acquisition of everyday concepts; but, according to Vygotsky, does not initially add much to the student's development of higher cognitive functions because these concepts are based on everyday, empirical experience. Spontaneous concepts therefore just add a rich experience to the learning process (Kozulin, 1990; Moll, 1990; Van der Veer & Valsiner, 1991; Vygotsky, 1978). Vygotsky is more concerned with creating opportunities to expose the learner to scientific concepts beyond a pragmatic and experiential moment. He argues that spontaneous concepts are unsystematic and contradictory, whereas scientific concepts are more abstract and used in a systematic and intentional way. Ideally the learner should be given opportunities to develop spontaneous concepts into scientific conceptualisation that corresponds with systematic reasoning, which is typical of the thinking in science and humanities (Kozulin, 2002).

According to literature reviewed in Chapter Three, educationally disadvantaged students often do not progress from spontaneous to scientific concepts in the absence of mediation. This dissertation explored the significance of developing scientific concepts in order to engage successfully with a Psycho-social module presented in a MBChB course. Chapter Six outlines the role of mediation to systematically teach students to move from spontaneous to scientific concepts.

2.3.5. Feuerstein's notion of mediation

As was mentioned earlier, Feuerstein's operationalising of mediation resonates well with the aims of the teaching and learning activities in the Intervention Programme. Feuerstein (Feuerstein, Klein & Tannenbaum, 1991; Kozulin, 2002) describes mediation as a deliberate intervention in the learning process to enable an opportunity for learning, where learning is viewed as cognitive change. According to Feuerstein (Feuerstein et al, 1991) mediation occurs when competent, experienced and well-intentioned persons interpose themselves between the learner and the sources of stimulation from which the learner must learn. A mediator selects relevant information and stimuli from the learning material and changes and rearranges the material in such a manner that the learner can interpret it. A mediator is therefore someone who opens up a process of learning. Ben-Hur (1998) describes a mediator as someone who teaches others to experience the world with meaning.

They schedule the appearance and disappearance of stimuli, they bring together stimuli that are separated by time and/or space, and they focus our attention on certain transformations in stimuli that we otherwise would overlook. (...) They teach us to compare the same experience using different criteria – how to sort relevant from irrelevant data. They help us to learn how to label our experiences and they teach us how to group them by categories (Ben Hur, 1998, pg 662).

According to Ben-Hur (1998), children who have not received adequate mediation are not prepared to deal with the cognitive challenges confronting them. These children are therefore unable to benefit from the wealth of classroom experiences, resulting in a failure to understand the reason behind a learning activity. For them the learning experience appears to be random and impulsive, and they only grasp the meaning of the experience episodically. Further, these children cannot select from several sources of information simultaneously, and are not able to use higher cognitive functions, such as comparing data, linking information and exploring causes, in a constructive manner. Thus even a challenging lesson can seem boring to them.

Mediation cannot happen in isolation and therefore implies interaction between the learner, the teacher and the teaching material, which supports Vygotsky's theory on social interaction. Educators should look for ways to foster learning by using signs and tools, such as language, to mediate learning material. In these interactions between teacher and student, an opportunity is created to develop and strengthen behaviours to communicate and learn more effectively. In order to explore factors impacting on cognitive development, it is crucial to understand the relationship and interaction between the tool, student and mediated activity (Boyd, 2000; Moll 1990). Chapter Six explores this relationship in three different learning contexts in the Intervention Programme.

2.3.6. How does mediation happen?

Various studies (Feuerstein et al, 1991) have shown that a mediated learning experience can be achieved if certain mediation criteria are met. During a mediated learning experience the mediator continuously involves the student in problem-solving activities. By applying certain criteria during these cognitive activities, the stimuli which the student responds to, become more organised and meaningful (Rand, 1991). As a result the student becomes equipped to cope efficiently with the task at hand, as well as developing autonomous behaviours to cope with similar situations in future learning activities. Feuerstein (Feuerstein et al, 1991) identifies three main criteria necessary for a mediated learning experience – intentionality and reciprocity, transcendence and the mediation of meaning.

Intentionality and reciprocity refer to the mediator's ability to focus on the needs of the learner and to then develop and shape the activity in such a way that it meets those needs of the learner (Feuerstein et al, 1991). The learner is alerted to the activity (intentionality) and compelled to respond (reciprocity). Tzuriel and Kaufman (1999) refer to this form of mediation as efficient registration of information by the student, adequate processing and efficient response. Klein (1991) explains intentionality as a deliberate process to achieve a change in the student's perception, processing or response. The mediator facilitates

intentionality via selecting, exaggerating, accentuating, grouping, sequencing or pacing stimuli. This can be achieved via the mediator's tone, volume, frequency and gestures. The type of questions asked by the mediator can signal intentionality to students (Ben-Hur, 1998). Feuerstein and Feuerstein (1991) refer to intentionality and reciprocity as the main conditions for a mediated learning interaction. According to them intentionality transforms the three partners involved in the interaction - stimuli, mediator and mediatee - in such a manner that it results in a response (reciprocity) from the mediatee. Intentionality therefore reflects that the mediator wants to teach something to the mediatee and the mediatee realises that the learning activity is not coincidental. Ben-Hur (1998) suggests that in order for intentionality to foster reciprocity, the mediator should choose and rearrange the content for students, and indicate the relevance of the material via gestures, questions or voice changes. When asking probing and challenging questions, sufficient time to answer should be allowed. Alternative ideas should be encouraged and students should be listened to with interest and care. Feuerstein and Feuerstein (1991) state that this form of mediation creates in the mediatee awareness of the learning process and of the didactic principles underlying it. Metacognitive skills develop as a result, taking the form of self reflection, insight and articulation. These skills in return become the steering power towards more efficient learning.

Transcendence happens when the mediator is going beyond the specific and primary goals of the learning interaction to provide the student with opportunities to increase his/her cognitive and affective range (Feuerstein, Klein & Tannenbaum, 1991). Transcendence as a mediation tool is therefore moving the student from simply knowing to understanding. As a result the student develops the ability to reflect on the underlying understanding of a learning situation (Feuerstein et al, 1991). The mediator goes further than the concrete context of the material and teaches the general rules of a learning experience. Learning tools used during the specific situation can therefore be internalised as generalised learning instruments (Ben-Hur, 1998; Tzuriel & Kaufman, 1999). To succeed in this, the mediator should show students how a learning tool can be applied to

different contexts and tasks. Students failure to see the transcendent manner of the learning tool, can lead to failure to understand the relevance of this tool in other learning situations. An example of this would be when literacy and numeracy skills remain isolated and fail to influence the overall cognitive and problem solving abilities of students (Kozulin, 2002). Transcendence therefore enables the student to make connections between the general and the specific. Through transcendence the student develops the ability to apply the learnt skill elsewhere in slightly different ways (Feuerstein et al, 1991). When transcendence is not actively present during a learning activity, the student does not necessarily understand the relationship between specific and general goals, and is not able to bridge the gap between previous and future learning material. (Feuerstein et al, 1991). In fact Ben-Hur (1998) states that it is predominantly transcendence which enables a student to make the obvious connections between current and previous learning experiences. Tzuriel and Kaufman (1999) see the goal of transcendence as moving a student from the immediate needs of a specific situation to applying the same principles in another situation that may have nothing to do with the original activity. Rand (1991) argues that two elements are necessary for an interaction to qualify as having a transcendent nature. Firstly the interaction should exceed the immediate need of the learning situation, and secondly it should exceed the fundamental teaching of a ready-made solution to a given problem. According to Rand (1991) the main objective of transcendence is to lead the student from the immediate learning situation towards exploring more improbable links between the specific situation and more general situations. It then becomes an integral part of the learning behaviour repertoire of the student. Transcendence means that the mediator goes further than the concrete context of the material and teaches the general rules of the experience, so that the tool can be appropriated and internalised as a generalised instrument (Ben Hur, 1998; Tzuriel & Kaufman, 1999). To succeed, a tool should be capable of organising cognitive and learning processes in different contexts. The learner should therefore be able to apply the same tool in different tasks. An inability to use tools in a transcendent manner indicates that the learner has not grasped the relevance of this tool in other learning situations. As a result skills, such as the ability to work with text, can

remain isolated and fail to influence the overall cognitive and problem-solving abilities of students (Kozulin, 2002).

The third part of the puzzle, *meaning*, deals with the value and relevance of the learning activity. Feuerstein et al (1991) refer to meaning as the process of turning implicit reasons for learning into something explicit, so that the mediatee understands the significance of the process. It is providing answers to “why/what for”. Ben-Hur (1998) argues that the choice of questions is very important in the mediation process, as it reflects the mediator’s expectations of the students. If questions are not challenging, mediation is going to fail. The mediation of meaning gives an objective and subjective value to a specific performance during the activity. Ben-Hur (1998) states that meaning creates cognitive and affective excitement in students, creating a sense of competence, because learning becomes a meaningful situation. In order to facilitate this process, experiences are grouped and regrouped by the mediator. The mediator discusses the learning goals with students, gives explicit value to a given experience, asks probing questions and encourages students to examine relationships between stimuli. In return students become critical thinkers who examine and understand the purpose of a learning activity (Feuerstein et al, 1991). Symbolic tools such as letters and numbers have no meaning outside the cultural boundaries which give them meaning and purpose. If students fail to grasp the purpose and meaning of these symbolic tools, the instrumental function is lost and students remain bewildered by symbols with no meaning or relevance to furthering their learning. Mediation of meaning therefore entails labelling information (Ben-Hur, 1998; Tzuriel & Kaufman, 1999).

The concepts of intentionality, reciprocity, transcendence and meaning are explored in detail in Chapter Six.

2.3.7. Mediated learning experience (MLE)

Feuerstein ((Feuerstein, Rand, Hoffman & Miller, 1980) defines a mediated learning experience (MLE) as

the way in which a mediating agent transforms stimuli emitted by the environment; usually a parent, sibling, or other caregiver. This mediating agent guided by his intentions, culture and emotional investment, selects and organizes the world of stimuli for the child. The mediator selects stimuli that are most appropriate and then frames, filters and schedules them; he determines the appearance or disappearance of certain stimuli and ignores others (pg 15).

According to Feuerstein (Feuerstein et al, 1991; Kozulin, 2002) the performance of a child before and after a mediated learning experience can vary dramatically. Looking at the current performance of a child, no prediction can be made regarding the child's ultimate performance level. The child should therefore not be measured against the average performance in society before being exposed to a mediated learning experience. One can therefore find similarities between Feuerstein's MLE and Vygotsky's ZPD.

Kozulin (2002) states that low levels of scholastic achievement and low levels of cognitive performance are the results of inefficient use of cognitive functions, which in return is a result of the level and nature of mediation received by students. Cognitive performance is therefore very closely related to mediated learning experiences. Feuerstein (Feuerstein et al, 1991) states that a mediated learning experience

produces in the individual the propensities to learn from, and become modified by, these experiences. (...) Lack of MLE turns the organism into a rigid system which benefits little from exposure to stimuli. (Feuerstein and Feuerstein, 1991, pg 13).

The model of MLE is not limited to critical periods of development. Even though early childhood is optimal for MLE, significant changes can be achieved during adolescence and young adulthood (Ben-Hur, 1998; Feuerstein et al, 1991; Kozulin, 2002). Chapter Three explores the use of MLE during higher education in various studies. Central to this thesis is the hypothesis that the Intervention Programme acts as a mediated learning experience.

2.3.8. Cognitive modifiability and “deficient” cognitive functions

Cognitive modifiability refers to the capacity of a person to change his or her developmental course (Feuerstein, Rand, Hoffman & Miller, 1980; Feuerstein et al, 1991; Kozulin, 2002). Feuerstein distinguishes between structural change and normal developmental changes in a person. Structural changes refer to the manner in which an individual responds to sources of information. In order for a structural change to occur, in other words for cognitive modification to occur, the individual needs to be exposed to a deliberate intervention programme that will facilitate cognitive growth. Cognitive modifiability is therefore the process to address certain “deficient” cognitive functions² in a very deliberate way.

Kozulin (2002) states that low levels of scholastic achievement and low levels of cognitive performance are the results of inefficient use of cognitive functions. Feuerstein et al (1980) refer to the reason behind impaired cognitive functions as deficiencies in functions underlying internalised, representational and operational thought. Successful performance of the cognitive operation therefore depends on addressing these underlying deficient functions. Deficient cognitive functions are however not seen as permanent intrinsic deficits, as the concept of MLE hinges on the ability of human beings’ cognition to be modified (Mosito, 2006). Feuerstein et al (1980) categorise cognitive deficiencies as difficulties that occur at the input, elaboration and output level. Below is an outline of the deficiencies, based on Feuerstein’s (Feuerstein et al, 1980) categories.

Impairment of cognitive functions during the input phase

This refers to the quantity and quality of data gathered as a student begins to solve or appreciate the nature of a given problem.

- Blurred, sweeping perception: This refers to an inability to recognise details, have clarity, an unfocussed definition of borders and sharpness

² Feuerstein’s use of terminology such as “deficient” “impaired” and ‘retarded’ lends itself to stigmatisation of learners. The dissertation will use the term “deficient”, and indicate how and why it is used, but will not adopt the view that students in the Intervention Programme are in any way “impaired”, “deficient” or “retarded”. Whenever possible the term “cognitive deficiency” will be replaced by “cognitive difficulty”. In this dissertation the concept will refer to an inability to engage appropriately with academic text.

and an incompleteness of the data necessary for distinction and description of a problem.

- Unplanned, impulsive, unsystematic exploratory behaviour: This refers to a disorganised approach to selecting cues necessary for solving a problem.
- Impaired receptive verbal tools and concepts, which affect discrimination: This is often related to a reduction in the intake of information; for example, the ability to perceive commonality or difference.
- Impaired need for precision and accuracy: This refers to carelessness with regard to gathering all the data needed in solving a problem, or partial gathering of data as the result of an inability to be exact.
- Impaired capacity for considering two sources of information at once: This is closely linked to the ability to be precise and accurate in gathering the necessary data to solve a problem. The elaboration process is affected by the inability to consider two sources at once.

Impairment of cognitive functions affecting the elaboration phase

This refers to factors hindering/obstructing a person from making efficient use of data available to him/her. The impairment of a proper data gathering process further obstructs proper elaboration.

- Inadequate experiencing of the actual problem and subsequent defining of it: This refers to the imbalance that exists when trying to define a problem.
- Inability to select relevant, as opposed to irrelevant cues in defining a problem: This is linked to the lack of an analytical ability to eliminate certain cues, and giving preference to others.
- Impaired need for summative behaviour: This refers to an inability to spontaneously find relationships amongst various pieces of information
- Lack of orientation towards the need for logical evidence: This refers to the inability to look for reasons to explain something. Typically a student will respond to a “why” question with the word “because”.

- Restricted inferential hypothetical thinking: This refers to the inability to deduce from a hypothesis
- Impaired planning behaviour: This refers to the inability to set goals and find steps to achieve the goal.

Impaired cognitive functions during the output phase

This refers to factors leading to inadequate communication of the outcome of the elaborative processes.

- Trial and error responses: This refers to the inability to follow a systematic approach using rules, principles and reflective reasoning.
- Impaired verbal tools for communicating adequately elaborated responses: This refers to the inability to share verbal responses in a systematic, clear and planned manner.
- Impaired need for precision and accuracy in communicating responses: This refers to the inability to use clear and correct labels when expressing a response.

Although identifying problems within the three categories is intended to bring some understanding into the range of cognitive functions, it is “the interaction between and among the phases that is of vital significance in grasping the extent and pervasiveness of cognitive impairment” (Feuerstein et al, 1980, pg 75). In Chapter Four these concepts will be operationalised in relation to the current study.

2.3.9. Brief overview of the Instrumental Enrichment Programme (IEP) and the Learning Potential Assessment Device (LPAD)

Feuerstein et al (1980) believe that the acquisition of the most basic cognitive functions and strategies does not require specific content materials. In this regard Feuerstein developed the Instrumental Enrichment Programme (IEP) to

change the overall cognitive structure of the retarded performer by transforming his passive and dependent cognitive style into that characteristic of an autonomous and independent thinker (Feuerstein et al, 1980, pg 1).

In this case a “retarded performer” is seen as someone who has not performed optimally, as opposed to someone with limited and deficient capacity (Feuerstein et al, 1980). Such a person could therefore benefit from a MLE where cognitive difficulties are addressed and modified.

According to Begab (in Feuerstein et al, 1980) the IEP uses abstract, content-free, organisational, spatial, temporal and perceptual exercises that involve a wide range of mental operations, traditional content materials of the regular classroom. The IEP consists of paper and pencil exercises which have been divided into a range of “instruments”. Each instrument focuses on a specific cognitive deficiency whilst also addressing many other prerequisites of learning (Mosito, 2006). This programme is therefore a cognitive intervention programme that is based on the concept of modifiability via a MLE. Although the Intervention Programme, studied in the current dissertation, serves a similar purpose, teaching and learning activities in the programme are operationalised differently. The next section will explore this in more detail.

Literature reviewed in Chapter Three refers to another programme designed by Feuerstein, the Learning Potential Assessment Device (LPAD). For the purpose of the dissertation it is sufficient to state that this programme offers an alternative approach to traditional and standard intelligence testing. Mosito (2006) describes LPAD as a programme that “breaks away from standard intelligence testing, as it evaluates learners’ ability to learn, rather than their manifest level of performance” (pg 46).

2.4. TOWARDS A THEORETICAL UNDERSTANDING OF THE INTERVENTION PROGRAMME

In an attempt to widen access and to implement transformation and equity, the Faculty of Health Sciences at the University of Cape Town introduced and established the Intervention Programme in 2002. This programme's implementation was stimulated by the development of a new problem-based

learning curriculum for the MBChB programme and replaced the Faculty's existing preclinical Academic Development Programme (Alexander et al, 2005). The aims of the new curriculum at the Faculty of Health Science include redressing imbalances of the past and addressing diversity to widen access. Students meeting entrance criteria enter as a single cohort, with an academic development programme taking the form of an Intervention Programme to address unsatisfactory performance at the end of semester one. Students who fail semester one, therefore enter the Intervention Programme for the duration of one year. After successful completion of the programme, they return to semester two to complete their first year of study.

The Intervention Programme provides students with equal opportunities to improve their academic performance by shifting their learning approaches into a more academic domain. Programmes in the Intervention Programme focus on acknowledging students' diverse backgrounds and recognising and developing their personal strengths. Learning difficulties in struggling students are carefully monitored throughout semester one and cognisance is taken of the typical cultural and social difficulties students from diverse backgrounds experience at an academic institution. Semester one serves as a "diagnostic" semester and the information collected during this period is used to guide learning activities in the Intervention Programme. Monitoring students in semester one is therefore an attempt to gain insight into students' understanding by exploring how cognitive difficulties impacted on their performance.

The new curriculum in the Faculty of Health Sciences follows a problem-based learning approach (PBL). The aim of PBL is to allow students to draw on and acknowledge their prior knowledge, and to identify gaps in their learning with the help of a facilitator. They learn to approach problems in a systematic way. The goal of PBL is for students to develop relevant content knowledge and metacognitive skills, which will enable them to become good learners and problem solvers (Harland, 2003). The starting point for a PBL session should therefore be the students' current knowledge and skills. Each student constructs

his/her own meaning based on an interaction with prior learning and current experiences (Harland, 2003). In the process students should develop metacognitive skills and reflect critically on their own learning; moving from actual point to potential point in Vygotsky's ZPD. In the medical curriculum at UCT, PBL is central to the core curriculum as it is regarded as a learning tool to develop problem solving and critical reasoning skills which medical students will need when diagnosing and treating patients. PBL facilitators are trained to encourage higher order thinking and critical reasoning. Typically facilitators would ask guided questions so that students can investigate relationships between ideas, apply theory to practice, use evidence based arguments and engage in the validity of multiple conclusions. PBL facilitators should not merely passively observe the process, but actively support problem-based learning by asking students to apply, analyse, synthesise and evaluate their knowledge, as this type of higher order thinking will enable medical students to develop critical reasoning skills, vital for succeeding in the clinical years. PBL facilitators can therefore be seen as human mediators. As the Intervention Programme prepares students to return to mainstream, its own learning methodologies are always locked into the aims and objectives of the mainstream curriculum. It is therefore essential that the Intervention Programme facilitates the same process of developing higher order cognitive skills, as these students will eventually return to a PBL environment described in the above section.

Together with lectures, practicals and PBL sessions, tutorials form the basis of the mediated learning environment of the programme. The Intervention Programme differs from the mainstream course in that all learning and teaching activities occur in small groups, and the human mediators, i.e. the lecturers in the programme, provide students with constant feedback on their progress. Students' understanding of the basic Biological and Psycho-social concepts and terminology are strengthened by revisiting material covered in semester one, and scaffolded PBL and tutorials are used as the central learning vehicles. This study explores the role of mediation in a Psycho-social module. The purpose of a Psycho-social tutorial in the Intervention Programme is to:

- strengthen students' understanding of the basic sociological and psychological concepts and terminology
- strengthen students' ability to think critically and apply their knowledge
- improve communication skills by encouraging participation in learning activities.

The overall objective of a Psycho-social tutorial is therefore to systematically mediate students' engagement with scientific concepts.

In the Intervention Programme skills are constantly reinforced within an appropriate academic context to emphasize relevance and applicability (Alexander et al, 2003). Even though Academic Literacy is a separate course with its own slot in the timetable, skills development in this course happens within the context of the overall Intervention Programme course work; for example, language and communication proficiency will be linked the content of a PBL session. In this regard the programme differs significantly from Feuerstein's IEP, where learning difficulties are not addressed within a specific context.

The objectives of Academic Literacy in the Intervention Programme are to enhance students' capacity to transfer skills and knowledge between different components of their studies, to promote language and communication proficiency and to develop skills to meet academic literacy demands. The methodology for the Academic Literacy course focuses mainly on mediating reading and writing skills. The lecturer (human mediator) shows students how to interpret and become familiar with the discourse (symbolic tools) of Intervention Programme disciplines. They are shown different kind of texts, how to respond to different kind of texts, how to analyse and understand text structure and how to structure their own writing.

Intentionality plays a key role in the Intervention Programme. Students are made aware of the intention of every learning activity before they start to engage with the material. PBL sessions, lectures, tutorials and Academic Literacy workshops are used to scaffold specific learning activities. Bruner (in Wood et al, 1976)

explains scaffolding as a process of providing higher levels of initial support for students, and then gradually dismantling the support structure as students progress towards independence. Eventually scaffolding would disappear. In this sense the Intervention Programme potentially opens a zone of proximal development, moving students from their actual development (failing semester one) to their potential development (ready to enter mainstream again). This is done through scaffolding of learning activities that are mediated via human and symbolic mediators. Students form a close bond with teachers in the programme, so human mediators also act as role models to demonstrate to students how spontaneous concepts should be developed into scientific concepts. The meaning of symbolic tools is clearly explained, and many exercises are done to demonstrate transcendence.

The Intervention Programme underscores the conceptual understanding of Feuerstein's theory of modifiability, but rejects the notion of a deficit model, as indeed, did Feuerstein. Students are therefore not seen as intellectually inferior or impaired. As was mentioned earlier, the Intervention Programme strives to address students' underachievement, but does not propose to modify students' intellectual abilities, as it is believed by the Faculty of Health Sciences that these students possess the necessary intellectual abilities to obtain a MBChB qualification.

To allow for opportunities leading to cognitive modifiability, the programme has certain objectives. These objectives include creating a safe environment where students can develop and refine skills and knowledge in order to continue with their studies; allowing for opportunities to identify and correct the many reasons for failure to learn effectively; promoting more effective learning for subsequent years; and aspiring to improve self-confidence in order to contribute to students' academic and personal growth and development. It aims at familiarising students with the modes of learning that will be required of them, as well as the style of instruction they will encounter in the rest of their studies. Learning activities in

the programme are designed to enhance students' capacity to transfer skills and knowledge between different aspects and components of their studies.

Regular formative assessment provides students with feedback on their progress. Formative assessment includes in-course assessment, whilst summative assessment refers to the final exam at the end of the programme. If students achieve a combined exam result and year mark of 50%, they continue with semester two in mainstream to complete their first academic year. The majority of students who have rejoined mainstream seem much better equipped to deal with academic demands, whilst a small minority are unable to succeed at the end of the programme, or remain unsuccessful once they have joined mainstream.

2.5. IN SUMMATION

This chapter aimed to orientate the reader by describing key concepts that are used throughout the thesis and by outlining the theoretical framework that guided the research methodology and analysis of results. In this regard the central themes of Feuerstein and Vygotsky's mediation theories have been explored. Although Vygotsky's (1978) articulation of mediation as a pedagogical strategy provides a fecund pedagogical tool, it is a high level concept that is difficult to operationalise. According to Moll (1990) Vygotsky never specified the forms of social assistance to learners that constitute a ZPD. He did refer to collaboration, direction and assisting children 'through demonstration, leading questions, and by introducing the initial elements of the task's solution.' but did not specify beyond these general prescriptions (1990, pg 11). Feuerstein has developed the IEP in which he not only theorises mediation but also provides a specific framework for mobilising this term in research. The research design of this thesis was therefore situated within Feuerstein's notion of how a mediated learning experience can address cognitive difficulties. The last part of this chapter gave an outline of the Intervention Programme and drew correlations between the theoretical framework chosen for the study and the programme's design. The next chapter will review current literature that guided the research design and corroborated with the theoretical framework

CHAPTER THREE

LITERATURE REVIEW

3.1. INTRODUCTION

The research design of the dissertation is situated within the context of an academic development programme's response to academic and cognitive difficulties experienced by first year medical students. The literature consulted will be discussed in three parts.

- Part one deals with the notion of academic underachievement and academic development.
- Part two reviews medical education as a context for this study.
- Part three appraises recent studies with regards to the role of mediation in addressing cognitive difficulties.

3.2. PART ONE: AN OVERVIEW OF ACADEMIC DEVELOPMENT

In order to gain a deeper understanding of the notion of “educationally disadvantaged”, literature elucidating the historical context of education in South Africa was consulted. Numerous researchers have observed and commented on the damaging role of apartheid on tertiary education in South Africa (Boughey, 2007; Burch, Sikakana, Yeld, Seggie & Schmidt, 2006; Craig, 2001; Hardman & Ng'ambi, 2003; Macdonald, 2006; McMillan, 2005; Mehl, 1991; Singh, 2000; Wood, 1998; Yeld & Haeck, 1997; Zaaïman, Van der Flier & Thijs, 2001). Researchers all agree that this system was responsible for deliberately creating under-resourced schools for Black students, which resulted in an imbalanced and fragmented education system in South Africa.

Macdonald (2006) states that education of Black children had been persistently neglected during all those years, causing high failure and drop out rates in Black and Coloured³ education institutions. In addition, teachers employed at Black secondary schools were not necessarily fluent in English and often reverted to their mother tongue during teaching and learning activities (Paxton, 2003; Pile & Smythe, 1999; Shay & Moore, 2002). Language development is critical to the

³ These labels are problematic, but they are still in use today.

learning process. Yet, at an age when the more complex cognitive aspects of language typically develop in children (Cummins, 1996), Black students were not educated in one language only, preventing them from having optimal opportunities to form a solid conceptual understanding of complex cognitive concepts. As a result students often did not grasp the fundamental building blocks of disciplines such as Science and Biology. Black students, who entered institutions of higher education where the medium of instruction was predominantly English, were thus ill prepared for the complexities of tertiary education (Alexander et al, 2003).

Research done by Singh (2002) concurs that Bantu Education⁴, which favoured rote learning, prevented students from developing academic literacy, knowledge depth and independent thinking required for successful performance at a tertiary level. Craig (2001) argues that students who were products of this authoritarian education system would encounter a steep learning curve with regards to content and form when they entered a university.

Mehl (1991) reasons that apartheid and the past history of South Africa's inequitable distribution of educational resources caused many people to experience deep rejection of themselves. According to him, many parents of Black students declared openly that they felt ignorant, illiterate and unskilled. They therefore did not feel confident to participate in their children's education, and had to rely on an already substandard education system to perform such a role.

When apartheid was replaced with a more democratic system in 1994, Bantu Education officially came to an end. However, its legacy of racially segregated schooling will continue to hamper education in South Africa. Even though the participants in this study completed their secondary schooling after 1994, students entering university from former educationally disadvantaged backgrounds are still

⁴ The Bantu Education Act, no 47 of 1953 was designed to direct Black learners to the unskilled labour market.

at significant risk of demonstrating poor academic performance and dropping out of their programmes due to the apartheid legacy (Burch et al, 2006).

3.2.1. The paradigm shift from academic support to academic development

During the early 1980s four historically White, liberal universities (Cape Town, Natal, Rhodes and Witwatersrand) incorporated “Academic Support” as part of their curricula (Boughey, 2007). The purpose of this endeavour was to

provide support to Black students who had gained admittance to university and who were deemed to be underprepared for tertiary education because of the poor quality of educational experiences previously offered to them under the apartheid regime” (Boughey, 2007, pg 6).

Moore (1998) states that academic support, in the form of supplementary programmes, was designed to assist incoming students in adapting to their first year at university. By providing assisted learning programmes, universities had some flexibility in their admissions criteria so that students, who might be termed “academically underprepared” but demonstrated potential, were not automatically excluded from higher education. At this stage, however, these students were a minority, primarily as a consequence of apartheid admissions policies, such as the University Amendment Act⁵, otherwise referred to as the Quota Act (Boughey, 2007; Moore, 1998).

During the 1990s, following the release of Nelson Mandela, the political climate of South Africa started to change dramatically. With the reality of enormous diversity in culture, ethnicity and socio-economic status at universities, academic support could no longer suffice as an attempt to assist a minority group of students (Thesen in Alexander et al, 2005; Volbrecht, 2003). Moulder (1991) states that tertiary institutions came to realise that the term “academic support” with its focus on the “underprepared” minority had to become redundant considering that an “underprepared” majority would constitute the mass of the student body before long. Mehl (1988) echoed this position by stating that tertiary institutions had to change the dominant privileged academic culture

⁵ Act 83 of 1983 stipulated a quota system for the number of Black students to study at traditionally “White” universities.

and reconceptualise ways to address the educational needs of their students. He challenged institutions to examine their basic underpinnings, and to move away from the notion of educational deficits where the “underdeveloped” could be “developed”.

In response to a more diverse student body, universities started to replace the Academic Support Programmes with Academic Development Programmes that focused more specifically on curriculum flexibility, and the incorporation of academic assistance within standard courses (Moore in Alexander et al, 2005; Volbrecht, 2003). The research context of this dissertation, the Intervention Programme at the faculty of Health Sciences, UCT, is an example of an academic development programme.

3.2.2. Becoming familiar with the concept of “at risk”

With political and educational transformation underway during the 1980s and 1990s and the concurrent widening of access to address diversity, most institutions started to explore and grapple with the notion of “at risk” students.

A study was done by Eiselen and Geyser (2003) to identify factors distinguishing between achievers and “at risk” students in Accounting 1A at Randse Afrikaanse Universiteit (RAU). Researchers applied qualitative and quantitative methods to explore factors that distinguish between achievers and “at risk” students. They explored how language proficiency, cognitive ability, academic background and perception contribute towards failure or success. “At risk” students were identified as students who averaged between 40% and 47% in their B Com Accounting programme. Researchers identified a range of factors contributing to failure or success of students; for example, lower scores on cognitive assessment measures in the absence of scaffolded activities. This study is relevant to the current dissertation not only because it explores language proficiency, academic background and cognitive scores in relation to “at risk” behaviour, but because it confirms that the notion of “at risk” students does indeed exist. In this study potentially “at risk” students also expressed a need for academic support, including improved learning situations, small group interactions and one-on-one

consultations as mainstream activities were not always addressing their academic requirements.

This dissertation will explore reasons for underachievement and academic “at risk” behaviour in order to understand how mediation opens up the ZPD. Various studies have been done to identify reasons why educationally disadvantaged students appear to become “at risk” during their tertiary studies. Slonimsky & Shalem (2004) identified flawed patterns in the way potentially “at risk” students approach their work, including a tendency towards verbatim reproduction, an inability to construct arguments, a tendency to focus on examples rather than principles, a tendency to write from a subjective viewpoint, often using anecdotes unrelated to the text and a tendency to be prescriptive rather than analytic. In a qualitative study to examine the academic difficulties experienced by oral hygiene students in their transition from high school to university, McMillan (2005) has found that lecturers perceived students to have difficulty with “approaching an assignment” and “solving a problem logically”, as students appeared to struggle with identifying relevant information. Some lecturers commented on the skills that first-year students still needed in order to be successful in academic writing; for example, to summarize articles and paragraphs. Lecturers noted that students struggled to understand assessment questions, and often their responses were incoherent and did not relate to the question. Students on the other hand described how the university system assumed that they had the skills in place to be independent learners. Chapter Seven draws a parallel between these findings and results from the current study.

In a study done to explore academic development strategies at Peninsula Technikon, Wood (1998) identifies language, culture, knowledge and transfer as factors that could impact on students’ performance. Amos (1999) argues that students who encounter learning difficulties do not lack inherent abstract cognition and that they are potentially able to engage with higher education. He suggests that these students have not mobilised particular cognitive processes to deal successfully with academic problems. Moll and Slonimsky (cited in Smith &

Edwards, 2007) echo this opinion by explaining that “at risk” students develop difficulties because they have never been taught to apply cognitive and language skills in analysing complex material in an abstract manner. Slabbert (cited in Smith & Edwards, 2007) argues that deep processing of information had not been encouraged in the apartheid education system, as learners were encouraged to rely on rote learning. In many ways these students never developed critical reasoning and problem-solving skills and as a result had to grapple with becoming accustomed to the ground rules of academic discourse. Added to that, Paxton (1995) describes how English second language students experience difficulties comprehending the highly abstract language of disciplines taught at university level. From the demographic profile in Chapter Four it can be seen that all the participants in this study were English second language speakers. Paxton’s findings are therefore highly relevant to the dissertation.

According to Mehl (1991) it is apparent that cognitive dysfunction of previously disadvantaged students cannot all be attributed to “poor socio-economic conditions”. He identifies three major reasons why students struggle at a university level: error factor, semantic difficulties and cognitive difficulties. Error factor refers to misconceptions, while semantic difficulties relate to academic literacy issues. Under cognitive difficulties he mentions problems in visualizing the physical situation, identifying implicit data, analysing the problem, elaborating on information, unsystematic and incorrect analysing of data and not being able to relate two sources of information correctly. These difficulties will be explored in more detail in Chapters Five and Seven.

3.2.3. Pedagogic responses of tertiary institutions to address underachievement

Against the backdrop of political change in South Africa, and the theoretical development of concepts such as Academic Support and Academic Development, tertiary institutions responded with various approaches to meet the demands of a more diverse student body. From the literature it was noted that institutions do not use a common or universal term to refer to these approaches.

Terminology ranged from “guided assistance” to “scaffolding” to “remediation”. Literature reviewed in this regard showed that there seems to be five broad approaches to addressing academic underachievement. The fifth approach, an intervention programme run at UCT, has already been outlined in Chapter Two.

i. Integrating academic development activities into mainstream

One such approach, favoured by many tertiary institutions, is integrating academic development activities into mainstream. Wood (1998) argues that scaffolded activities, such as a separate academic literacy course, should not consist of disconnected “skills packages”, as students fail to understand the transfer of these generic skills to a different context. He explains how the then Peninsula Technikon made a shift towards curriculum development, addressing cognitive difficulties holistically. Wood argues that this can be achieved by making the discipline more accessible to students, expanding opportunities for learning by creating supplementary materials, increasing relevance and integrating cognitive development strategies into the mainstream materials themselves.

Amos (1999) supports the viewpoint that academic literacy needs to be integrated into mainstream activities. He discusses how the Psychology Department at Rhodes University draws on Vygotsky’s theory regarding cognitive processes and potential. Vygotsky argued that the cognitive processes needed for success are potentially present and that academic potential can be developed via mediation. In order to achieve this, Amos suggests that small group tutorials, under the guidance of a tutor, can provide an ideal context for students to develop academic literacy valued by a certain discipline. Many educators, when addressing academic difficulties, view small group tutorials as a key tool to address learning difficulties. Craig (cited in Amos, 1999) argues that tutorials develop dialogue and conversation skills, while Radloff and Murphy (cited in Amos, 1999) discuss the potential of deep learning in tutorials. Amos (1999) makes a case that small group tutorials can lead to the development of problem-solving and critical thinking skills. However, simply putting students into small groups will not necessarily foster learning; therefore he suggests that a learning situation needs to

be created, facilitated and actively mediated. In Chapter Six the current study outlines the role of small group activities in the Intervention Programme.

McMillan (2005) explores academic difficulties experienced by oral hygiene students the University of the Western Cape in their transition from high school to university. Drawing on empirical evidence from a cohort of first-year oral hygiene students, McMillan's research addresses ways in which tertiary institutions can respond to ensure a better preparation for the academic challenges at university. Based on a qualitative study to determine student and lecturer perceptions about academic performance, she suggests that learning difficulties can be overcome by teaching certain competencies in an academic literacy component of a mainstream course. Examples of competencies include deconstruction of the discourses and epistemologies specific to the discipline, academic writing skills, independent learning skills, examination and test strategies as well as study skills. More specifically, McMillan proposes the development of skills such as extracting information from text, planning a logical flow to an academic essay, extracting correct information to present an argument, answering specifically what is asked by the question, identifying key concepts and responding appropriately to assessment demands.

ii. Foundation programmes

Another approach, favoured by programmes at tertiary institutions to address academic difficulties, is a foundation course. Wood (1998) argues for foundation programmes at entry levels where students can be coherently introduced to a discipline and the academy. Mathews, Glencross and Kentane (2000) describe how a one year Science Foundation Programme at the then University of Transkei aimed to prepare disadvantaged students for admission to BSc courses. Their research explores whether "a guided, open ended, interactive, foundation-building, practical-orientated, skills developing, remedial, physical science course would improve the level of conceptual integration (ability to identify, differentiate, correlate and integrate similar concepts in Physics and Chemistry) of these students" (pg 160). During the course educators actively facilitated activities

where students had to deconstruct misconceptions and reconstruct correct scientific knowledge. This research also used pre- and post-tests in various scientific concepts to investigate the impact of the intervention procedures. Statistical and qualitative analyses indicated that conceptual integration of the participants improved. The researchers came to a conclusion that the study environment and the special care provided by lecturers enabled students to consolidate their knowledge base and to integrate knowledge. This research is relevant to the current study as it indicates that facts rote learned by students is useless to them, unless they are given guidance and opportunities to build their own knowledge.

Du Plessis, Janse van Rensburg and Van Staden (2005) have done a study to explore the role of a foundation programme which was implemented to align learners cognitively for entry into a national diploma in information and communication technology (ICT). The Vaal University of Technology (VUT) experienced alarming low pass rates in the subject Programming I between 2000 and 2004 and as a result implemented an entry-level certificate in ICT during 2003 in order to widen access, to improve pass rates and to provide articulation for a diversity of learners into the Higher Diploma in ICT. Based on research done by Ashman and Conway (cited in Du Plessis et al, 2005) researchers hypothesised that education programmes based on cognitive classroom methods can lead to successful learning. In the foundation course learners were assisted to develop their information processing and learning and problem-solving skills through their active involvement in the learning activities. The designer of the course underscores the principle that memorisation of information and rote learning can make a very limited contribution to cognitive development. The ICT foundation modules therefore offered extensive practical application of problem-solving through projects, practical sessions and formative assessments. The aim of the course was to redress the whole learner by enhancing cognitive, emotional and social skills. ICT skills, English comprehension skills and numerical skills formed the central learning vehicles of the course. In order to assess the value of the course, data was obtained from pre- and post-tests assessing fundamental

problem-solving skills, vocabulary, reading comprehension, mathematical skill, and strategic learning skills. Results indicated that access was indeed widened while the added curriculum had a positive impact on the learners' cognitive skills. According to Du Plessis et al (2005) this study contributes to numerous findings in the literature advising that learners can be cognitively modifiable. The researchers of this study conclude that tertiary institutions cannot ignore the cognitive skills gap between secondary and tertiary education and that systems need to be put in place to address the diverse needs of the learners at higher institutions.

Another study that underscored the value of a foundation course was done by Wood (2005). In this study he discusses findings from an analysis of focus group interviews held with former Nelson Mandela Metropolitan University Foundation Programme (UFP) students. The research used a qualitative approach to get a deeper understanding and representation of students' perceptions and points of view within the context in which they find themselves, and to allow for elaboration of their experiences of the foundation programme. The UFP was introduced in 1999 as an alternative access programme for students who did not meet faculty admission requirements. The purpose of this programme was twofold: to offer educationally disadvantaged students access and to provide opportunities for developing the necessary skills, knowledge, attitude and values which will prepare them for success at tertiary level. Results from the data analysis indicated that the foundation programme had an extensive impact on all aspects of the students' lives and not necessarily only on their academic performance. Results from a longitudinal study also showed that students who completed a foundation year seemed to perform better in later degree studies than directly admitted students with similar academic profiles. This would suggest that as the students' metacognitive skills develop, they are able to make the connection between what they learnt in the foundation programme and their current performances. Drawing on research done by Mumba, Rollnick and White (cited in Wood, 2005) Wood argues that the development of cognitive skills at the

foundation level is essential, as the current South African educational context does not seem to deliver on this front.

iii. Additional support activities

The third type of academic intervention used by tertiary institutions is the notion of additional support activities. Parkinson, Jackson, Kirkwood and Padayachee (2007) did a study at the University of Kwa-Zulu Natal to describe an academic literacy course for second language English speakers who do not meet Science entrance requirements, but who enter university through alternative access routes. Students are from disadvantaged schools, lacking resources such as laboratories, computers, libraries, electricity and qualified teachers. However, these students are regarded as having the potential to obtain a Science degree, with additional support. It is not clear from the research how potential is determined. The research explains how scaffolding of reading and writing acquisition is achieved in a 26-week science-based course, *Communication in Science*. By using science content, the course aims to improve reading strategies and to familiarise students with the pedagogical genres of science. Reading and writing is integrated into the course work and learning activities are scaffolded by using group work and assisted classroom exercises, such as model reading by the tutor, mapping, alerting students to key words and frequent comprehension testing. Comparing results from a pre- and post- English proficiency tests showed an increase in performance, with students performing better in both written and comprehension parts of the test.

iv. Extended curricula

Extended curricula, using an academic development framework to address learning difficulties, are also in existence at many institutions. Smith and Edwards (2007) analysed the impact of the University of Cape Town's (UCT) first-year microeconomics academic development course on performance in examinations. The School of Economics, in collaboration with the Department of Academic Development at UCT, developed a two-semester microeconomics course for academically disadvantaged students to enable them to meet some educational

challenges. Similar to the participants in the study done by Parkinson et al (2007), these students do not have sufficient matriculation points to be accepted into the Commerce Faculty; but given the right environment, it is believed that they have the potential to achieve a Bachelor of Commerce degree. In this course the tutorial system plays a key role in developing students' meta-learning skills. Activities in the tutorials were scaffolded and more intensive, compared to mainstream learning activities. The study compared performance of the academically disadvantaged cohort with a control group drawn from the mainstream in both the first-year microeconomics courses, and subsequent courses in first-year macroeconomics and second-year microeconomics. Results from the analyses suggest that the academic development course had an impact on students' performance in the structured/essay questions, relative to the control group, in first- and second-year microeconomics and for the multiple-choice questions in first-year macroeconomics. However, the study stresses the significance of matriculation results and the role of mathematics, physical science and English first language as prerequisites for entering the course.

3.2.4. The value of support activities

This dissertation explores whether mediation plays a role in addressing underachievement. I am therefore working from a specific theoretical framework, outlined in Chapter Two; however, to become familiar with the overall value of support activities, I consulted literature indicating that scaffolded activities impact positively on academic performance. Onsongo (2006) did a study to assess the impact of academic support on the University of the Witwatersrand (Wits) first-year engineering students. Academic support programmes for engineering students are designed to challenge students cognitively and to develop skills and attitudes necessary for the professions. Teaching and learning activities are done in small group tutorials with increased contact and an appropriate academic loading. Onsongo has found that even though there is room for improvement, academic support programmes have been effective. Although there have been changes in race demographics for the student intake to study engineering at Wits, pass rates have not changed much from those recorded in the past when the

students came predominantly from a privileged background. Onsongo argues that this proves the relevance of academic support, as the students who graduate through the academic support programmes otherwise were destined to be dropouts.

Research discussed thus far has focussed on South African tertiary institutions; however, there is also evidence that institutions all over the world realise the value of assisted learning. One such a study was done by Chaplin (2007) to describe how modelling and coaching students in “active study” improves higher order skills. The data shows how science students who received coaching, performed significantly better on exams, compared to control groups. Although this study was not done on South African students, she argues that science students at the University of St Thomas in Minnesota, United States, performed poorly in introductory courses because they had poor critical reasoning and problem-solving skills. Her study shows that these students needed to adopt new skills to improve critical thinking in order to move from rote learning to an understanding of how to solve problems. In her study she draws on several methods used in United States colleges to engage students in metacognitive efforts and found that as students become aware of the learning process, they engage better with the learning material. In her study she found an increase in exam performance of students who were coached in active studying tutorials, compared to groups who received no coaching. The reason for their improved performance she correlates to active guidance from tutors who addressed misconceptions specifically related to the construction of a concept map of experiments in the lab. Only when tutors discussed the content of the map with students, and assisted them in misconceptions, did improvement show.

3.2.5. “Non academic” factors and academic performance

This study draws mainly on literature exploring the impact of inequitable distribution of educational resources during apartheid on academic performance and responses of tertiary institutions to address this problem. However, for future studies it is important to not focus only on “deficits” when exploring reasons for

academic performance. Leibowitz, Booi, Daniels, Loots, Richards and Van Deventer (2006) show that recognition of differences can play a key role in students' identities, which in return can impact on performance. Bangeni & Kapp (2005) are also exploring the role of dominant academic culture and influences from home on identity formation of students at a university level. In her master's thesis, Mokgokong (2007) highlights affective-motivational factors, attitudes towards studies, adjustment to university, study methods and socio-economic conditions as factors impacting on the performance of first year dental therapy students. Feuerstein et al (1980) identifies a category that could result in cognitive difficulties, namely affective-motivational factors linked to thinking and learning. They state that these factors could have a negative impact on the cognitive processes of the disadvantaged student, resulting in poor academic performance.

Numerous studies have been done to investigate the relationship between learning, cognitive changes and affective motivational factors. Tzuriel and Kaufman (1999) discuss the role of motivation in determining children's intellectual achievement in dynamic assessment, Seifert (2004) argues that competence and control are key issues in ensuring motivation, which in return could lead to satisfactory academic performance, whilst Dweck (1986) outlines how motivational processes can affect cognitive tasks.

Neurobiological studies have shown that "dedicated circuits in the brain will focus attention and organize behaviour when a reward that is consistent with internal needs, appears obtainable" (Viamontes, Beitman, Viamontes & Viamontes, 2005, pg 29). If this reward is seen as significant and useful, the brain can exercise control, which results in the temporary exclusion of other motivational circuits. Current research has also shown that motivational circuits are interlinked with the brain circuits that support learning and memory. In other words, when certain areas in the brain remember rewarding circumstances, it will facilitate their repetition (Viamontes et al, 2005).

Therefore, although this study focuses mainly on cognitive difficulties experienced by educationally disadvantaged students, there is widespread research indicating that an extensive range of factors contributes to academic performance at tertiary level. These factors should be borne in mind when reading the current dissertation.

3.2.6. Part One: In summation

Many researchers agree that apartheid had a detrimental effect on the South African Education system. The legacy of apartheid is still haunting tertiary institutions as many students from former educationally disadvantaged backgrounds experience academic difficulties which put them “at risk”. In the wake of transformation and the concurrent move to widen access, tertiary institutions moved from the notion of Academic Support to Academic Development in an attempt to address learning needs of a more diverse student body. From the literature it appears that the majority of institutions opted for one of four theoretical frameworks: incorporating scaffolded learning activities into mainstream activities; additional learning activities for a selected group of students; an extended curriculum with support tutorials; or a foundation course before students embark on their tertiary studies. The fifth option, an intervention programme where unsuccessful students’ learning difficulties are identified during their first year course and addressed in a separate programme, forms the empirical setting of my dissertation and is discussed in Chapter Two.

Studies have also indicated that pre- and post-tests are frequently used as part of data gathering and analysis to explore the impact of intervention programmes on “at risk” students. Results have indicated that small group tutorials, structured academic literacy exercises and active guidance from a tutors or lecturer seem to have a positive impact on academic performance of “at risk” students. Similar teaching and learning activities will be observed in the current study. Although not actively explored in this dissertation, literature also indicates that academic performance can be influenced by a wide range of “non academic” factors.

A final word...

The interventions discussed in the literature review thus far often refer to small group tutorials, structured learning activities and guided assistance as scaffolding. The current dissertation understands this as mediation in the zone of proximal development (ZPD). In this study mediation refers to assisted performance as opening up of a ZPD. These terms were defined and discussed in Chapter Two.

3.3. PART TWO: MEDICAL EDUCATION AS THE CONTEXT FOR THIS STUDY

Similar to an overall transformation of the education system in South Africa since 1994, transformation in MBChB curricula in recent years has prompted educators to reconceptualise learning and teaching activities.

3.3.1. Health needs of South Africa

The increasing health needs of South Africa are a cause of concern to everyone, from politicians to health care workers to the people in the street. Infectious diseases such as tuberculosis have spiralled in the past decade (Gandhi, Moll, Sturm, Pawinski, Govender, Laloo, Zeller, Andrews & Friedland, 2006). Fuelled by the HIV epidemic, it has been difficult for tuberculosis programmes to improve outcomes. Surveys also affirm that there is still a high HIV prevalence, specifically among young people. Pettifor, Rees, Kleinschmidt, Steffenson, MacPhail, Hlongwa-Madikizela, Vermaak and Padian (2005) have investigated the prevalence of HIV amongst young women, and have found it a disproportionate risk. Breier & Wildschut, (2006) state that South Africa has a doctor to population ratio that is low compared to international standards. They also comment on the vast health discrepancies between urban and rural areas and the stark divide between the public and private health sector. Against this current backdrop, medical students are prepared for their indispensable roles and responsibilities as South African doctors.

3.3.2. Changes in Medical Education

Historically only three of the eight Medical Schools in South Africa trained Black medical students. Since 1994, with the transformation of the country, most previously White Medical Schools had to change the demographic profile of their students, and in the process widen access (Breier & Wildschut, 2006). The Health Professional Council (HPCSA) of South Africa stipulated in 2002 that curriculum changes also needed to be implemented to produce suitably trained doctors to address the dire health status of the country. These changes included provision for mastery of generic skills, introduction of problem-based learning (PBL) to make teaching more practical, relevant and stimulating, and more emphasis on communication skills. The HPCSA required Medical Schools to ensure that learning became curiosity driven, was geared towards self-exploration and enabled students to critically evaluate content. The outcome of this new teaching methodology was intended to improve students' responsibility as self-directed learners. The HPCSA further stipulated that medical students should become life-long-learners and have access to academic support

3.3.3. Problem-based learning (PBL) and Medical Education

According to Boud and Felletti (cited in Breier & Wildschut, 2006) PBL can be dated back to medical curricula reforms in the 1960s at Mc Master University in Canada. The principle idea of PBL is to start with a problem that students want to solve. Schmidt (1983) describes PBL as an instructional method that can provide students with problem-solving skills. According to Schmidt, PBL can be measured against three principles of learning: activation of prior knowledge, elaboration and encoding specificity. Tulving and Thomson (in Schmidt, 1983) explain encoding specificity as a learning opportunity where there is a close resemblance between the situation in which something is learned and the situation in which it is applied. The closer the resemblance, the better the performance of the student within the learning situation.

Morrison (2004) describes the main purpose of PBL as a learning tool to effectively acquire knowledge. PBL follows seven structured steps, starting with activating students' prior knowledge to help them understand new information,

then moving on to a discussion phase, giving students an opportunity to add to new knowledge, and finally giving students the opportunity to identify gaps in their knowledge. Students set their own learning objectives and go away to find answers before the next session. All of the above is set in an authentic context to help students apply their knowledge to clinical situations.

In recent years the effectiveness of PBL has received some criticism; for example, Colliver (2000) claims that there is no convincing evidence that PBL does indeed improve the knowledge base and performance during the clinical years. In return, Norman and Schmidt (in Bligh, 2000) argue that more theory-based research is needed before such conclusions can be drawn. PBL has many advantages, but it runs the risk of information overload for the student who does not have critical reasoning skills to differentiate between relevant and less relevant information (Breier & Widschut, 2006). Elder and Paul (1994) define critical reasoning as the ability of thinkers to take charge of their own thinking. They argue that to facilitate this, students should develop sound criteria and standards for analysing and assessing their own thinking, and routinely use these criteria and standards to improve the quality of their own thinking.

Interim analyses of research results done by Burch et al (2006) indicate that the introduction of problem-based learning at the University of Cape Town has not had a detrimental effect on the performance of academically “at risk” medical students. Iputo & Kwizera (2005) have done similar research at UNTRA and have found that the introduction of the problem-based learning/community-based education (PBL/CBE) curriculum coincided with improved academic performance. They argue that this approach to medical education may have contributed to this improvement. This statement will be further discussed in the next section.

3.3.4. Academic support/development and Medical Education

An investigation done by Lehman, Andrews & Sanders (2000) regarding change at South African Medical Schools revealed that all Medical Schools have put academic support innovations and selecting mechanisms in place since the late

1980s and early 1990s to widen and facilitate access for students from historically disadvantaged educational backgrounds. Although the academic support programs differ considerably with regards to format and size, they “share the common goal of assisting students from disadvantaged educational backgrounds to adjust to the rigours of academic study” (Lehman et al, 2000, pg 12).

According to Lehman et al (2000), support initiatives comprise the following elements: mentor and peer support (most schools), staff development (University of Witwatersrand), outreach programmes aimed at learners with potential for successful study in medicine (University of Stellenbosch), extended curricula with additional support activities (most schools) or academic development activities embedded in mainstream teaching and learning situations (most schools). Unfortunately there is very limited literature published on the nature, extent and outcomes of academic development and support initiatives at South African Medical Schools.

De Klerk, Van Deventer & Van Schalkwyk (2006) did a study at Stellenbosch University to evaluate the impact of academic development interventions in all the faculties, including Health Sciences, and have found that extended degree programmes have the potential to enhance student success. There is however only a small contingent of Black students at Stellenbosch who may or may not fall into the “at risk” category. Based on matriculation results and access tests, the greater number of students who currently fall into this group are Coloured and, to a lesser extent, White first language Afrikaans speakers. The Faculty of Health Sciences was the only faculty where the graduation rate is higher than the attrition rate of their extended development programme students, which could be an indication that academic development programmes have had a positive impact on the medical curriculum. In an email conversation with Ms Susan van Schalkwyk, Coordinator of the Extended Degree Programme, she indicated that the Faculty of Health Sciences at Stellenbosch is currently undergoing significant change; for example, preparing for a possible shortening of the MBChB curriculum to five years and the concurrent academic development structures that will need to be put

into place. In addition, she envisages that the format of the extended development programme would be modified to keep up with the changes to the mainstream curriculum. Ms Veena Singaram, MBChB1 Coordinator at Nelson R. Mandela School of Medicine, indicated in an email that academic development is still in its embryonic stages, with the introduction of additional tutorials at this Medical School. The University of Pretoria offers a one-semester science foundation course provided by the Science Faculty and a mentorship programme to assist first-year students with the adjustment to the academic, social and professional demands of Medical School. Mentors are expected to trace their students' developments and to report any circumstances that might require official intervention to support structures of the Faculty. Research conducted by the Faculty indicates that the majority of students viewed this system in a positive light (Lehman et al, 2002). Walter Sisulu Medical School (UNITRA) has introduced a Science Foundation Year Programme to accommodate students coming from extremely disadvantaged academic backgrounds who do not meet entrance criteria. On completion of this programme, students reapply to the Faculty of Health Sciences for admission. This Medical School does not have a designated academic development programme, as it is believed that the problem-based learning curriculum and small group tutorials provide enough support. In fact, as mentioned earlier, Iputo and Kwizera (2005) have indicated that the problem-based curriculum could be responsible for recent improved academic performance of their students. The current study would argue that human mediation of symbolic tools during these sessions contributed to improved performance.

All of these interventions are not without problems. Lehman et al (2000) suggest that the separation of students into different streams leads to stigmatisation and an unwillingness to participate in programmes. They also mention that academic development and support programmes that are not integrated into the mainstream teaching methodologies and frameworks can lose their effectiveness when students return to their mainstream courses. Although the study is not actively exploring the concept of stigma and separate streams, it acknowledges that any

endeavour using achievement to stream students, becomes problematic and can have an impact on students' performance.

3.3.5. Medical Education and international research

Research done by Kies and Freund (2005) at the University Of Illinois College Of Medicine has indicated that first year medical students with academic difficulties who enter the Decompressed Programme outperform and require less time to complete the curriculum than those students who fail and repeat the first year. The Decompressed Programme is a remedial option for students to spread their first year course requirements over two years. Alternatively they can choose to simply repeat the year. To compare the decompressed and repeating groups, pre- and post- admission metrics were examined. The pre-admission metrics included cognitive assessments while the post-admission metrics included graduation rates, length of time to graduation and attempts at courses. The researchers acknowledge that financial, health, and family issues could have been possible confounding variables, but for the purpose of their study these factors were not obtained. Kies and Freund (2005) report widespread use of extended programmes in the United States, but they also comment on the limited outcome information in the literature on these programmes. What is key to this research is the fact that the data demonstrate that selection criteria are not a reliable predictor of success. They conclude that a remedial programme is the best predictor for success later in the medical curriculum.

Sayer, De Saintonge, Evans & Wood (2002) did similar research at St Bartholomew's and the Royal London School of Medicine (SBRL), Queen Mary's School of Medicine, University of London. A number of students who were unsuccessful in the continuous assessment process were invited to participate in a remedial programme comprising an initial educational diagnosis of their academic difficulties, followed by academic support and tutorials. As in the research done by Kies and Freund (2005) the researchers found that causes for academic failure are widespread. After completing the remedial activities, students reported improved motivation and demonstrated improved academic

performance. The researchers conclude that students can benefit from an individually tailored remedial programme, which in return contribute towards successful performance in subsequent parts of the curriculum.

3.3.6. Selection and entrance criteria at UCT's Medical School

In Chapter Five “at risk” academic behaviour is identified by using a range of scores. The notion of reliable predictors of success at a tertiary level is problematic; however, the following section will draw on literature to outline how these scores are calculated for entrance criteria at the Faculty of Health Science, UCT. The tests are important to this thesis because they provide insight into the students who enter the Intervention Programme.

i. Matriculation score

At the Faculty of Health Sciences at UCT applicants for the MBChB degree are ranked according to a matriculation examinations score deriving from a conversion of the Senior Certificate Examinations results (Burch et al, 2006). This score is a conversion of a matriculation symbol into numerical scores: for example an A symbol will earn the applicant eight points, a B symbol seven points and a C symbol six points. The first part of the score is calculated from a fixed set of three subjects: English, Mathematics and Physical Science. Thereafter the next three top symbols are used for the calculation of the rest of the score. As a result of the highly competitive matriculation results of Medical School applicants and data suggesting that lower matriculation results lead to poorer graduation throughput rates, the minimum score was set at 42 in the past. According to Burch et al (2006) applicants were considered to be academically “at risk” if “they had (a) obtained a matriculation examinations score between 35 and 41 (out of a possible 48), and (b) attended a school considered to be educationally disadvantaged on the basis of prior racial segregation” (pg 175). In the new curriculum however, all students enter as a single cohort to remove the stigma of racially based selection criteria. Semester one has now become the diagnostic semester, and the extended programme became an intervention programme

(Alexander et al, 2005). Currently high school performance is therefore only seen as an “estimate” in conjunction with other scores and not static selection criteria.

ii. Quantitative Literacy Test

All incoming Health Science students write a quantitative literacy test to assess their mathematical competency. This test consists of three parts, including basic numerical ability, the interpretation of graphs, tables and diagrams and the application of everyday quantitative literacy. Students who score less than 70% in this test are seen to require additional support to meet the quantitative literacy skills required for their particular course of study (Prince, Frith & Jaftha, 2004). Chapter Five will refer to scores from this test.

iii. Health Science Placement Test

As was mentioned in Chapter One, matriculation scores alone can no longer be seen as a single reliable predictor for performance at a tertiary institution. Health Sciences Programmes have recently requested additional mechanisms to assess applicants. At UCT all applicants write an alternative admissions assessment. This assessment is referred to as the Alternative Admission Research Project test (AARP). According to Yeld (2001) the AARP test plays a crucial role in providing additional means for entry for applicants who would not otherwise gain entry on the basis of their matriculation results, as these do not reflect their level of potential. The Faculty of Health Sciences receives two sets of scores for each section of the AARP test: a score based on the total pool of writers and a score from writers from comparable educational backgrounds (Cliff & Hanslo, 2005). The AARP consist of four sets of test: the Scientific Reasoning Test (SRT), the Placement Test in English for Educational Purposes (PTEEP) and two tests dealing with mathematical achievement and comprehension (Cliff & Hanslo, 2005). For the purpose of this thesis, only literature related to the SRT and PTEEP were reviewed in order to assist with describing academic and cognitive difficulties experienced by students in the Intervention Programme. According to Cliff and Hanslo (2005) longitudinal research has shown that students with test scores falling in the top four deciles of test performance against their peers are

regarded as being “recommendable” for selection, given that other selection measures, for example matriculation scores, are also taken into consideration. Although students’ educational background may also have an impact on their academic performance within a certain curriculum framework, it is believed that ranking within the top four deciles makes students recommendable for selection (Cliff & Hanslo, 2005). Please see Appendix VII for a description of the individual clusters of the SRT and PTEEP.

3.2.7. Part Two: In summation

Many doctors qualifying from Medical Schools in South Africa will have to work in under-resourced areas whilst being faced with the vast health needs of the population. In order to equip them for this demanding task, medical education has undergone transformation in recent years, with the focus on turning medical students into life long learners with problem-solving abilities and critical reasoning skills. Problem-based learning has been introduced in some of the schools, with research indicating that this process enables students to access and apply knowledge to “real life” situations from an early stage of their curriculum. However, one of the dangers of problem-based learning is that it could lead to information overload for students unfamiliar with this process of sifting, sorting and applying knowledge. All eight Medical Schools in South Africa have put academic support/development structures in place to assist students who could potentially become “at risk”, ranging from foundation courses to additional support activities to extended curricula. As indicated by both national and international research, these programmes usually have a positive impact on performance. The Faculty of Health Sciences at UCT has recently started to use additional mechanisms to guide the selection process for MBChB applicants. The relevance of scores from these measurements will be discussed in more detail in Chapter Five. This study will therefore investigate the challenges facing first year medical students to construct health science knowledge against the backdrop of medical education in South Africa; a backdrop where students on the one hand have to become self directed, life long learners, but on the other hand face academic difficulties as a result of an educationally disadvantaged background.

3.4. PART THREE: CURRENT STUDIES ON MEDIATION

The concept of mediation has been discussed in Chapter Two. The purpose of this part of the literature review is to explore how current studies operationalise mediation in research. From the literature it appears that this concept, or aspect of mediation, is applied in most scaffolding and remedial activities discussed thus far. There is however limited recent research on Feuerstein's concept of mediated learning experiences used at tertiary level. The literature indicates that studies on mediation and mediated learning experiences often centre on younger learners with specific learning needs. Another research focus of mediation is the concept of dynamic assessment.

3.4.1. Learning needs and younger learners

For the purpose of this study, literature focussing on mediation and the learning needs of young learners will not be discussed in detail, as it is not specifically significant to the current study. However, to provide more background on the South African learning context, it is useful to briefly mention a series of studies done by Skuy (2002) regarding the development of mediated learning experiences (MLE) in this context. Skuy proposes that the specific learning needs of particular groups, and the unique socio-political situation in South Africa, can be better understood by applying the Instrumental Enrichment (IE) thinking programs and the Learning Potential Device for Assessment (LPAD) in conjunction with other structures. The current study would argue that the UCT Medical School's Intervention Programme provides a similar lens to exploring learning needs of educationally disadvantaged students. Skuy's studies underscore the value of mediated learning experiences in the transformation from an apartheid-based authoritarian education system to an integrated and cognitive based system. These studies focussed on IE and the integration of socio-emotional components in MLE, temperament and MLE, multicultural education and MLE, the role of IE in developing creative thinking in teachers from an educationally disadvantaged background, and finally the role of IE in developing thinking skills for teachers. Although mixed results were obtained from the above mentioned studies, Skuy concludes "the studies to date demonstrate that both IE and MLE can serve as

effective springboards for the promotion of cognitive development and also for the implementation of a cognitive approach to cross-cultural harmony and thus societal development” (pg 109). The dissertation would agree with Skuy’s findings regarding MLE and the promotion of cognitive development, but proposes that mediation activities be embedded in a specific context, as opposed to the more generic approach of IE.

3.4.2. Dynamic Assessment

According to Tzuriel and Kaufman (2006) dynamic assessment measures the “implementation of learned strategies and cognitive principles in progressively more difficult problems” (pg 360). After mediation the child’s performance is a better indication of his/her prognosis of achieving academic success. Murphy and Maree (2006) explain that the concept of dynamic assessment draws on the theories of Vygotsky and Feuerstein as it aims to assess potential rather than a static ability and involves a pre-test and post-test design. In between the testing mediation happens and the difference between pre- and post-test scores is usually an indication of ‘potential’. The dissertation will explore whether participants’ academic performance differs before and after an intensive mediation period and will draw on a key study done by Tzuriel and Kaufman (1999) to examine the relation between MLE and cognitive modifiability among children who underwent cultural change. Using dynamic assessment they investigated the concept of cultural difference in Ethiopian immigrant children who had to adapt to Israeli society. For this study they drew on the work of Vygotsky’s (1978) ZPD and Feuerstein’s (Feuerstein & Feuerstein, 1991) MLE theory as they compared first-grade Ethiopian immigrants with a group of Israeli born children. Initially there was a significant difference between the two groups’ pre-teaching scores, but after a short, intensive teaching process the Ethiopian group improved and performed more or less on the same level as the Israeli born children with regards to post-teaching and transfer tasks.

Dynamic testing in South Africa has focussed on educationally disadvantaged students and many tertiary institutions have used this concept in order to

understand the complex notion of reliable predictors of potential (Murphy & Maree, 2006). This is discussed further in Chapter Seven.

3.4.3. Cognitive demands and higher education

With regards to mediation and mediated learning experiences at tertiary level, a key study informing this research was done by Mehl (1985) who investigated the cognitive difficulties of first year Physics students at the University of the Western Cape. Data analysed from interviews conducted with first year Physics students as they attempted to solve problems, revealed three broad categories where difficulties were experienced. The first category, semantic difficulties, had an impact on the manner in which students analysed and used information. This led to the second category of cognitive difficulties experienced as a result of semantic difficulties. The third category dealt with reasoning patterns and misconceptions that deterred students from accurately solving problems.

Semantic difficulties experienced by students included reading problems while trying to interpret words within the context of a problem. Students for example were not able to distinguish between “everyday language” versus scientific language. Cognitive difficulties (relevant to this study) included the ability to make a qualitative evaluation of the actual problem, the ability to identify implicit data, elaboration of information, systematic approach to data analysis and relating two sources of information. This will be discussed in Chapters Five and Seven.

The next step in Mehl’s study involved an analysis of the Physics curriculum to understand the cognitive demands and difficulties experienced by students, linked to Feuerstein’s categories of cognitive “deficiencies”. Blurred and sweeping perception, unplanned, impulsive and unsystematic exploratory behaviour, lack of precision and accuracy, impaired use of two or more sources of information, lack of interiorization and lack of planning behaviour emerged as the most likely categories to use when trying to make sense of the cognitive demand of Physics in relation to students’ difficulties. Mehl deduced that once the cognitive characteristics of students can be linked to the requirements of the Physics course,

suitable long-term remedial materials could be produced. In conclusion Mehl states that remedial and compensatory materials will not necessarily develop specific cognitive abilities that students can automatically transfer to other areas. However, his study has analysed the cognitive abilities required to cope with the Physics syllabus, and given suggestions for the use of compensatory materials in cases where students have not developed the necessary abilities.

Mehl (1991) continued with this research, using a case study to explore the role of mediation at a university level, specifically in a South African milieu. Drawing on the cognitive difficulties experienced by students in his previous study, he examines the role of mediation in the teaching of Physics. He describes the scaffolding procedures to guide students in analysing data constructively and systematically. Mehl concludes that even at a university level students can be assisted to acquire and master content areas, assuming that lecturers have proper insight into students' fundamental learning problems.

Oon-Seng Tan (2006) did a study at the University of Singapore to investigate the challenge of preparing engineering graduates for a fast-changing work environment. According to him it does not help to only address the content and process skills related to a subject in order for students to learn effectively. It is imperative that specific aspects of cognition, such as planning behaviour, accurate perceptions, systematic exploratory behaviours, simultaneous handling of various sources of information and logical thought are also addressed in learning programmes. His study uses three approaches. Firstly he asks whether an intervention programme can address such cognitive functions; secondly he investigates the role of the teacher as a mediator to identify possible deficient cognitive functioning and bring about change in the cognitive patterns of the learners; and thirdly he explores whether there is a sound theoretical basis and other empirical research that support such an intervention. Oon-Seng concludes that Feuerstein's criteria of a mediated learning experience and his list of cognitive dysfunctions are two key dimensions for an intervention programme, as both aspects enable students to gain insights into their own cognitive abilities in

order to develop metacognition. Based on Feuerstein's Instrumental Enrichment Programme he discusses a Cognitive Modifiability Intervention that incorporates affective-motivational processes, MLE, cognitive functioning and how to implement instruments for intervention and transfer. He suggests that this programme should be evaluated by looking at students' feedback, but also at quantitative measurements to determine the effects of the intervention on cognitive abilities, attitudes and academic performance. This study is relevant to my research as it suggests a framework for studying mediation; however, the current study will argue that one needs to explore a more in-depth methodology for observing actual mediation interactions in order to conclude that a MLE impacts on cognitive functioning.

Tribus (2005) also draws on the work of Feuerstein when he discusses ways to improve engineering education. Reflecting on his experience as an engineering educator in the United States of America, he comments on the challenges facing engineering educators in this booming age of information technology. Educators are no longer in a position to provide all the answers. According to Tribus (2005) no one can even predict the content that engineers will have to master a decade from now. The solution to this problem lies in developing life-long, autonomous learners who can adapt to rapidly changing situations. In his study he discusses Feuerstein's concept of Cognitive Modifiability as a method to understand cognitive processes, which in return can foster cognitive development and result in life-long-learners. Through the use of Feuerstein's MLE, the learner becomes aware and begins to understand his or her own reasoning processes. The learner can now use metacognition to improve his or her skills and eventually become an autonomous learner.

3.4.4. Part Three: In summation

Literature on mediation spans a broad range, including studies drawing on Vygotsky's notion of the ZPD, Dynamic Assessment, learning needs of young learners and the demands of higher education. To understand the full spectrum of mediation, the current research briefly explored studies done with younger

learners as well as research done on the ZPD. Key to this study however are results from research done with university students to explain the role that mediation can play in addressing cognitive and academic difficulties. Literature on Dynamic Assessment was also consulted, as the dissertation explored a pre-test, mediation process and post-test scenario to understand the impact of mediation in an academic development programme on underachievement.

3.5. CONCLUSION

Medical education demands of students to become self-directed and lifelong learners. Literature indicates that problem-based learning (PBL), one of the teaching methodologies used to facilitate this process, has been implemented successfully by certain Medical Schools; however, there is caution that the educationally disadvantaged student could struggle with information overload in this type of curriculum. Research also indicates that structures are required to accommodate the potentially “at risk” student, specifically with regards to cognitive processing and semantic demands of higher education. There is ample research to suggest that scaffolded learning and teaching programmes enable students to develop and strengthen the necessary cognitive abilities to cope with higher education. A key concept to this study is the notion of mediated learning. Research has indicated that mediation proves to be implemented particularly successfully when there is a comprehensive understanding of the cognitive difficulties experienced by students in a specific programme. For this purpose many studies apply pre- and post-tests to reveal to researchers the level of potential in students.

The dissertation therefore intends to draw on the literature reviewed in this chapter, but intends to add to current literature by providing a more in-depth look at the potential significant impact of mediation in an Intervention Programme; specifically in the context of academic development of medical students, as literature in this regard is very limited. The next chapter will outline the research methodologies used to explore the role of mediation in the Intervention Programme.

CHAPTER FOUR

METHODOLOGY

4.1. INTRODUCTION

This chapter outlines the methodology used to interrogate the research question that consisted of three parts: an error analysis, observations and interviews. Part one focuses on identifying typical errors made by students who were unsuccessful in the June exam 2006, and subsequently entered the Intervention Programme. This error analysis provides a better understanding of cognitive difficulties experienced by educationally disadvantaged students. This part links directly to part two, where the role of mediation in the construction of foundational knowledge was observed and described. Part three, the interviews, is used to compare students' comments with the error analysis and the observational data.

4.2. RESEARCH DESIGN

This is a descriptive study with a qualitative and multi-method focus. In order to collect and analyse the data, a collective case study was chosen as the overall research design. The goal of a case study is to give an accurate and comprehensive description of events, or related events (Zucker, 2001). Bromley (1990) identifies a case study as a "systematic inquiry into an event or set of related events which aims to describe and explain the phenomenon of interest" (pg 302). In this dissertation the phenomenon of interest is the mediation techniques used in a Psycho-social module of an academic development programme for educationally disadvantaged MBChB students.

A collective case study, according to Stake (1994), is attained when a number of cases jointly inquire about a phenomenon or general condition. According to Stake (1995) a researcher should use a collective case study in order to gain a deep and rich understanding into a specific phenomenon. Even though individual cases might be similar, and sometimes dissimilar, each one is chosen because the researcher deduces that it will lead to better understanding of the selected theory. Yin (1984) agrees with Stake (1995) that a researcher's reason for using a case study should be to get the best possible explanation of the studied phenomena. By

studying more than one case a deeper understanding of the theory can be gained. Yin (1984) refers to this method as a multiple case design. According to Denzin and Lincoln (1994) a multiple case design as unit of analysis assists the researcher to focus on a specific phenomenon because any random sample may not always be the appropriate strategy to gather the greatest possible amount of information. In the current study, three lecturers and their teaching 'spaces' form the collective case study. According to Flyvbjerg (2006) a random selection of data is often not the richest in information. To develop a deep sense of the question asked in this dissertation, multiple data sources were used. These sources included an error analysis, observations and interviews. To ensure a systematic inquiry into my selected theory, a collective case study was therefore chosen to interrogate data from the Psycho-social module. The multiple sources of data served to triangulate findings.

Method and analysis occurred as an iterative process in this research. I moved from literature on mediation to data and back to the literature. The advantage of approaching the case study in this way was that I could converge on a real life situation, and test the data directly in relation to mediation as it unfolded in practice (Flyvbjerg, 2006). According to Yin (1994) this is the preferred strategy when "how" and "why" questions are being asked.

A variety of empirical materials - text, interviews, observational, and quantitative data - were investigated and analysed within the natural setting of the Intervention Programme. Although quantitative data were used to explore academic shifts, the main focus of the dissertation was to describe the process of mediation. A qualitative research focus was specifically selected, as Denzin and Lincoln (1994) suggest that this type of approach can lead to an in-depth understanding of a research question. Two theoretical models, Vygotsky's theory on the ZPD, as well as Feuerstein's model on mediation, were applied to observe and describe processes where they were most likely to occur; in this case, the teaching and

learning activities in the Psycho-social module of the Intervention Programme. Empirical materials and study participants were therefore not randomly selected.

This study used a strategy of inquiry where the located concept, i.e. mediation in a Psycho-social module of an Intervention Programme, was linked to propositions and interrogations in order to demonstrate how the theoretical framework discussed in Chapter Two is traceable in the empirical data (Janesick, 1994). According to Denzin and Lincoln (1994) a strategy of inquiry connects a hypothesis to the method of collecting and analysing empirical materials. Methodologically this was achieved by applying an *inductive* as well as a *deductive* approach to the data analysis.

Deductive approach

Typically, a deductive approach draws on a well-established and existing theory to inform the development of the hypotheses and the resulting empirical measures which the researcher intends to use (Neuman, 1994). Within this approach the researcher formulates a particular theoretical framework and then sets about testing it (Denzin & Lincoln, 1994). Miles and Huberman (1994) describe this process as one where the researcher chooses a conceptual framework to describe and explain a pattern and underlying relationships, and then moves deductively towards conceptually analytical categories. This study used a deductive approach to identify categories of mediation used in the Intervention Programme, drawing on Feuerstein's categories of mediation. Three learning activities were observed to identify examples of mediation, and to create categories of similar patterns emerging from all the activities. This was then compared again with existing theory on mediation.

Inductive approach

Qualitative research, however, is an iterative process. In the study analytical induction was used to uncover regularities and patterns within a set of exam scripts in order to derive a theory of typical cognitive problems experienced by students in the Intervention Programme. Inductive analysis means "that the patterns, themes, and categories of analysis come from the data; they emerge out of the data rather than being imposed on them prior to data collection and

analysis” (Patton, 1980, pg 306). Denzin and Lincoln (1994) suggest that in most cases the qualitative researcher will use a mixed model of inductive and deductive analyses when moving into verification mode; in other words, a succession of research cycles.

4.3. TOWARDS A CONCEPTUAL FRAMEWORK FOR THE STUDY

The aim of the study was to interrogate the role of mediation in an academic development programme for first year medical students. In order to achieve the aims of the study, the following research question was formulated:

How does an Intervention Programme mediate knowledge to educationally disadvantaged medical students?

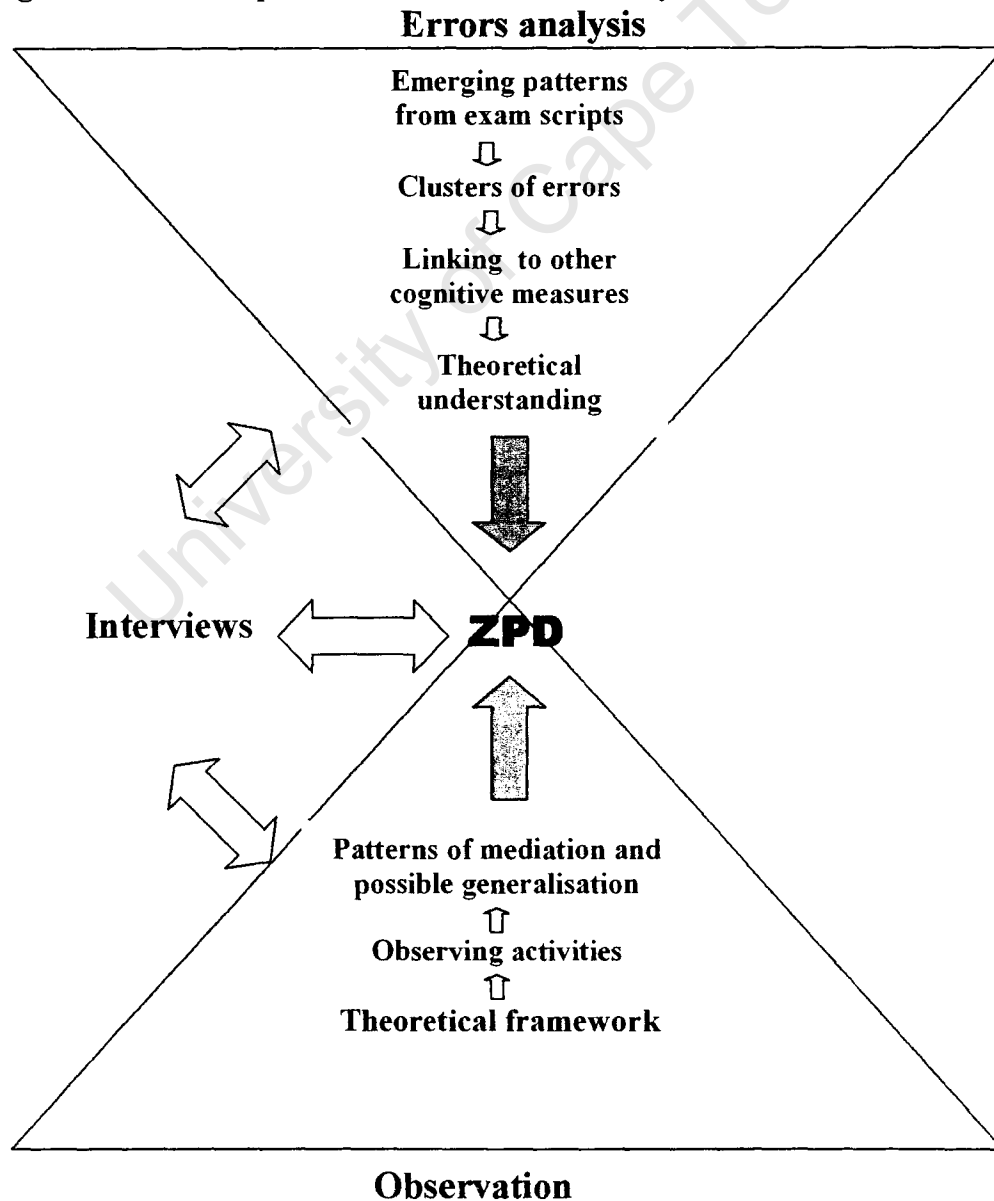
The following sub-questions guided the collection and analysis of the data:

- In what ways do educationally disadvantaged students demonstrate academic “at risk” behaviour?
- How does the Intervention Programme scaffold learning activities?
- How do students view the role of the Intervention Programme in strengthening their academic performance?
- Does mediation in the Intervention Programme lead to a shift in test performance and shift students academically?

Figure 4.1 suggests that an inductive approach to typical errors made by students, as well as a deductive approach to mediation during teaching activities in the Intervention Programme, both lead to a better understanding of opening the collective zone of proximal development (ZPD) of students in the Intervention Programme. Vygotsky’s notion of the ZPD was defined in Chapter Two. The conceptual framework for the study, as presented in Figure 4.1, demonstrates how an error analysis, observational data and interviews were used to interrogate the ZPD of the participants through a systematic enquiry into the research question. The top part of Figure 4.1 demonstrates the inductive process followed in doing an error analysis of typical mistakes made by students during the June exam. By identifying and linking patterns and themes emerging from the error analysis, a better theoretical understanding of academic and cognitive difficulties

that are characteristic of educationally disadvantaged students could be established. The bottom part of Figure 4.1 outlines the deductive process followed to identify how mediation is used in the programme. By using existing theory to identify patterns of mediation used by lecturers in three different educational settings, a process of enumerative deduction was followed to show that mediation plays a key role in the Intervention Programme. This process will be explained in more detail in Chapter Six. Figure 4.1 also demonstrates how interviews were used to link patterns from both the error analysis and observational data with patterns emerging from students' responses in order to gain a deeper understanding of their experience of mediation in the programme.

Figure 4.1: A conceptual framework for the study



4.4. DATA ANALYSIS

As was mentioned before, three methodological approaches were followed to analyse the data. The following section will outline the process of data analysis for each of the three methodological approaches.

4.4.1. Error analysis

In order to answer the sub question exploring ways in which educationally disadvantaged students demonstrate academic “at risk” behaviour, an error analysis was used. In applying steps suggested by Miles and Huberman (1994) to generate meaning from data, exam scripts of students who were unsuccessful in a mainstream MBChB course, and subsequently entered the Intervention Programme in June 2006, were analysed in order to move from a concrete to an abstract understanding and explanation of cognitive difficulties experienced by Intervention Programme students. Feuerstein et al (1980) identify a cognitive function as a process that identifies and relates to the prerequisites for thinking. If a student is therefore experiencing difficulties with regards to optimal cognitive functioning, the underlying reasons for the unsatisfactory performance should be analysed before embarking on a scaffolding process to intervene via mediation. The purpose of the error analysis was therefore to identify possible problems experienced in the underlying functions of answering questions. Mosito (2006) refers to a similar process in her research as an analysis of errors guiding the researcher towards an understanding of cognitive changes. In other words, by analysing the errors, insight is gained as to “what errors account for lack of success in executing tasks” (pg 121). As outlined in Figure 4.1 an error analysis was done through an iterative process of finding patterns within the typical errors made by students, clustering the data, linking the data with Feuerstein’s categories of cognitive difficulties in order to identify underlying difficulties, and finally making theoretical coherence by linking the data analysis to existing theories. Errors were therefore inductively identified initially, as I was not working from a specific framework. As Mosito (2006) states, any answer

in the script that deviated from the correct outcome of the task was noted for analysis.

i. Familiarisation with data

In order to become familiar with typical errors made by students during their June exam an inductive process was followed. The aim of the process was to:

- identify the type of errors made by students
- explore patterns and themes within the data
- gain an understanding of the most common errors made by students
- link errors with Feuerstein's categories of cognitive difficulties
- assemble a coherent understanding of the academic performance of educationally disadvantaged students before they enter a process of mediation.

This process drew on the suggested framework by Miles and Huberman (1994) and included the following steps:

- broadly describing errors
- noting patterns and themes
- attempting to see plausibility
- clustering errors
- counting the most common errors made by students
- subsuming particulars into the general by exploring more abstract relationships between errors and existing theory

In order to address the sub question regarding the role of mediation in shifting students academically, an error analysis was repeated at the end of the first six months in the programme to ascertain whether the same errors were still prevalent after a process of mediation. In addition to the error analysis pre- and post- test scores from the SRT and PTEEP were analysed to describe any cognitive shifts that occurred during the first six months of the programme. This part of the dissertation therefore explored whether mediation in the Intervention Programme lead to a shift in test performances, and thus shifted students academically.

ii. Identifying and describing the errors

To start the process of identifying the errors, I stayed close to the data by noting broad categories of errors made in the scripts. I went through the Psycho-social scripts of the ten identified participants and noted all answers where students did not obtain the set marks per question. The question paper has been included in Appendix I for closer scrutiny. Students were unsuccessful in the exam based on these three broad categories:

- Student gave completely the wrong information so no marks were obtained.
- Student gave an incomplete or partially correct answer so full marks were not obtained.
- Student made no attempt to answer the question.

iii. *Noting patterns and themes*

In order to move from a concrete and obvious framework towards themes and patterns that could in return lead towards a conceptual understanding of the typical errors made by students (Denzin & Lincoln, 1994), I mapped the errors into categories based on the necessary skills and competencies students needed to perform the tasks successfully. The categories were derived from comments that markers made on the scripts. Appendix III shows examples from scripts. All ten students had difficulty with all the questions asked, thus no question was excluded from analysis. Comments from staff who marked the scripts included:

- *Wrong theory*
- *Extend your answer.*
- *Write more to the point.*
- *You were supposed to explain, not list.*
- *Incorrect word (usually a question mark to indicate the marker does not understand what was meant)*
- *Substantiate your answer. What does the theory say?*
- *What do you mean by this?*
- *Read the question again!*
- *Link your answer to the case.*
- *Too much! (Or a line drawn through part of the answer)*
- *Explain the debate in more detail.*
- *Where is part two of the question?*
- *Use the case to find your answer.*
- *Indicate the sequence more clearly.*

Based on these comments I attempted to identify themes surrounding the type of questions asked during the exam. Although I did not attempt to analyse the reason why students had difficulty with answering the questions at this stage, I started to take cognisance of the skills involved in performing these tasks; for example, the ability to retrieve the correct information, the ability to link concepts and the ability to apply knowledge. A closer look at the data revealed that all questions and answers could be classified into the following general themes:

- Students had to recall learned material; for example, simply describe Psycho-social theory/phenomena.

Example: Outline the sequence of language development in early childhood.

- Students had to link concepts; for example, compare and contrast two theories or bodies of knowledge.

Example: Outline the sociocultural theory and the epigenetic theory of gender development. Now explain the difference between these two theories.

- Students had to construct a coherent argument by applying their knowledge to the paper case given in the exam.

Example: Explain how Pumela's socio-economic status (SES) may impact on her emotional and physical wellness.

- Students had to construct a coherent argument by applying their knowledge to theory; for example, using theory to explain why a person behaved in a certain manner.

Example: Using Kübler-Ross's theory, explain the different stages that Jean might have followed when her husband died.

Based on the comments from markers and the three themes that emerged, I identified fourteen typical errors. Examples of the actual data are given in tables 4.1, 4.2 and 4.3, which follow later in the chapter.

1. Students were unable to identify correct information from a body of knowledge.
2. Students only answered part of the question correctly / left out detail.
3. Students did not get to the point.
4. Students did not understand action words.

5. Students left out a question.
6. Students used incorrect terminology/ language.
7. Students did not link their answer to theory, so the answers stayed superficial.
8. Students gave incoherent answers.
9. Students misunderstood the questions / misinterpreted the focus of the questions.
10. Students did not relate/link concepts.
11. Students did not elaborate or substantiate their answers.
12. Students gave irrelevant detail.
13. Students did not apply their knowledge to theory or the paper case.
14. Students made sweeping statements or speculated.

iv. *Initial plausibility*

Miles and Huberman (1994) describe initial plausibility as a first impression of the data that still needs to be explored further by using more thorough tactics. At this stage the researcher is looking for a sensible explanation to understand a phenomenon before carrying on with the study, as the current analysis does not have proper grounding for a final conclusion. From the data obtained thus far, it seemed a reasonable explanation that students had difficulty executing the tasks because of the following three reasons:

- They were unable to retrieve and recall the correct information from a body of knowledge even *before* they attempted answering the question, so they might have left out the question, or got the answer wrong.
- They were not performing the correct “thinking” or “processing” actions *during* the answering of the questions so they might get some of the marks, or none at all.
- They were not formulating a coherent answer *after* they came to a solution so they either got few marks for their effort or none at all.

Based on Mehl’s study (1991) in identifying reasons why students struggled at a university level (discussed in Chapter Three), I started to consider that these participants were struggling for the following reasons:

- Psycho-social as a discipline: Could it be that students were having misconceptions about the discipline? This is the first time that most of them are coming into contact with Developmental Psychology as a rigorous discipline (as opposed to popular reading material in magazines and general opinions about the behaviour of people). Could it be that they did not understand how Psychology, as a discipline, fits into their degree?
- Cognitive difficulties: Could they experience cognitive difficulties with gathering and retrieving the correct information, processing it and presenting it in a coherent manner? Could this be a result of poor schooling?
- Academic literacies: Could it be that students were not able to transfer the necessary academic literacy skills in order to respond to questions with a well structured answer?

v. *Clustering errors*

Miles and Huberman (1994) refer to the clustering of errors as finding names and cognitive frames for categories. Clustering can be seen as moving to higher levels of abstraction where the researcher would, for example, group, merge, link and condense data. This process is a conclusion-drawing tactic where the researcher must guard against premature closure.

This part of the process involved clustering the fourteen errors into three categories:

- Problems with accessing correct information to enable students to answer a question
- Problems with using and processing information correctly whilst preparing to answer the question
- Problems with formulating the construction of a coherent and logical answer.

Identifying the three clusters was based on my experience of working in the Intervention Programme for six years where I am co-designer of the programme. The design of the programme follows a process where Intervention Programme staff compiles a “risk list” every year from assessment feedback in the diagnostic semester. Assessment feedback is obtained from interviews with unsuccessful students and mainstream staff. This list is a systematic documentation of typical mistakes experienced by mainstream students in order to plan teaching activities in the programme. I therefore considered myself more than a novice in recognising clusters of errors made by students. Flyvbjerg (2006) talks about the importance of recognising the value of a researcher with context-dependent knowledge, as opposed to someone who has theoretical knowledge only. He states that what is common to all experts, however, is that they operate on the basis of “intimate knowledge of several thousand cases in their area of expertise.” (pg 222). In order to ensure expertise, I also met with mainstream staff responsible for designing the Psycho-social module who assisted me with this process. Tables 4.1, 4.2 and 4.3 represent the three clusters of errors based on markers’ comments, my own interpretation and verification with mainstream staff. Errors were numbered as they were identified in the data and hence, in the tables, numbers should only be read as referring to the order in which errors were identified. They have no significance beyond this initial labelling stage.

Table 4.1: Errors linked to accessing information

Errors	Examples from the question paper	Examples from the scripts
<u>Error 1</u> Students were unable to identify correct information from a body of knowledge.	Example: Using the case, explain Harry's parenting style. Now explain the effects that this type of parenting can have on a child.	Students identified the incorrect parenting style, and therefore were not able to elaborate. <i>Authoritative. Children are more likely to be successful at school. They grow as happy people.</i>
<u>Error 2</u> Students only answered part of the question correctly / left out detail.	Example: Outline the sociocultural theory and the epigenetic theory of gender development. Now explain the difference between these two theories.	Students only answered the first part of the question; for example, they did not proceed to explain the difference between the two theories. <i>Sociocultural is the society around which you live or the culture to which you belong it can shape your gender identity. Epigenic is the genes and environmental factors that shape one's gender identity.</i>
<u>Error 5</u> Students left out a question.	Any question	Students obviously did not have the necessary knowledge (or ran out of time).

Table 4.2 : Errors linked to processing information

Errors	Examples from the question paper	Examples from the scripts
<p><u>Error 4</u> Students did not understand action word.</p>	<p>Explain four (4) developmental tasks that face Harry and Kate during their middle age.</p>	<p>Students merely listed the tasks. <i>Tasks to self</i> <i>Tasks to relating to interpersonal relationships</i> <i>Tasks relating to work and leisure</i> <i>Tasks relating to the community</i></p>
<p><u>Error 7</u> Students did not link their answer to theory, so the answers stayed superficial.</p>	<p>Using Kübler-Ross's theory to explain the different stages that Jean may have followed when her husband died.</p>	<p>Students did not refer to the theory in the answer, instead gave a very superficial overview of emotions people experience after death, for example "crying a lot" or "missing him a lot". <i>Jean is first very sad that her husband died. She is also crying a lot and missing him a lot. She cannot believe he is really dead and she cannot accept his death. Jean is not coming to terms with her bereavement and not going through all the steps of death.</i></p>

<p><u>Error 9</u> Students misunderstood the questions / misinterpreted the focus of the questions.</p>	<p>Outline the nature-nurture debate by explaining how each would view gender differences.</p>	<p>Students argued whether the nature or nurture debate is the “correct” way to explain how a child develops.</p> <p><i>There is no conclusion which theory is the right one. The one theory says nature is more important and the other one says that nurture is more important. We do not know which one is the right one, but parents will follow one of the theories when they bring up their child. This will impact on the gender development of their child.</i></p>
<p><u>Error 10</u> Students did not relate/link concepts.</p>	<p>Explain four (4) developmental factors which could shape Harry’s adjustment to retirement.</p>	<p>Students selected four factors from a list they studied, and did not relate it to the next part of the question.</p> <p><i>Attitude of others determines how soon you will retire. Health. If you get a terminal illness, or backache, you will retire sooner. SES: Your socio-economic status like your education, income and job.</i></p> <p><i>Financial security, like a retirement fund and outstanding debt. Harry has to adjust to his retirement and various factors make him come to the decision.</i></p>

<p><u>Error 11</u> Students did not elaborate or substantiate their answers.</p>	<p>Explain how Pumela's socio-economic status (SES) may impact on her emotional and physical wellness.</p>	<p>Students did not extend the answer. Different from a sweeping statement, students had the correct information, but did not substantiate the answers. In the last sentence the student is indicating that there is a link between Pumela's SES and her physical health, but fails to elaborate enough in order to demonstrate how SES might be related to physical and emotional wellbeing.</p> <p><i>Pumela is knowing when professional help is needed. Her domestic work usually requires long hours of cleaning the house and therefore result in some physical strain on her body. She also needs a proper diet and exercise. She has a low SES and it impacts negatively in her physical health.</i></p>
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<p><u>Error 13</u> Students did not apply their knowledge to the paper case.</p>	<p>Using the case, explain whether or not Jean is ageing successfully.</p>	<p>By far the most common error made by students. Students discuss the theoretical part of the question, without applying the knowledge to the paper case provided. The majority of the Psycho-social questions expect students to apply their knowledge to characters from the paper case (as they would be expected to apply their knowledge to patients one day). In this example the student outlines two theories on ageing, but does link the most appropriate theory to the case.</p> <p><i>Disengagement theory. Holds that a person's social sphere decrease with age, because of the way society allocate responsibilities. Traditional roles are unwilling and unavailable as friends die or move away, co-workers stop asking for help and children have families of their own. Activity theory shows the opposite. When you are active, people make time for you.</i></p>
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Error 14

Students made sweeping statements or speculated.

Using the case, explain whether or not Jean is ageing successfully.

Students speculated how Jean's involvement in charity work would impact on her education (speculation) or discussed how certain processes of ageing are "normal" without providing evidence. *Jean is getting involved in charity and therefore she is becoming creative. Creativity is good for her, as it will give her a reason to learn. If she learns more, even if she is old, she can still improve her life. Then her mental health is also getting better because she stimulates her brain with new things. Even if Jean is not doing all the things she must do to age successfully, this is normal for old people to start forgetting things and for their friends and family to stop visiting so much. Her friends are all dying, but that is part of growing old. She accepts it and grows old successfully.*

Table 4.3 : Errors linked to constructing answers

Errors	Examples from the question paper	Examples from the scripts
<p><u>Error 3</u> Students did not get to the point.</p>	<p>Explain four healthy (4) ways in which Harry could cope with stress.</p>	<p>Students would describe stressful factors in Harry's life, but failed to take the answer to the next level by addressing coping mechanism. Instead, the answer became rambling without any conclusions, going round in circles <i>Harry could do four ways to cope with his stress. He is working long hours and he is the breadwinner. He worries about his family and his job is demanding. If Harry does not address his stress, his stress levels will increase. He needs to find to have coping mechanism to cope with stress in a healthy way. From the case this is not happening.</i></p>
<p><u>Error 6</u> Students used incorrect terminology/ language.</p>	<p>Identify and explain one (1) work hazard faced by Harry in his work environment and one (1) work hazard faced by Kate in her work environment.</p>	<p>Instead of "ergonomic" hazards, students would refer to the concept as "economic" hazards. Instead of "psycho-social" hazards, students would refer to the concept as "personality" hazards. The descriptions of the concepts were however correct, so it appeared as if they were confusing terminology.</p>

		<i>Harry: Personality hazard. He is developing stress that is due to long working hours, and not enough family time and work overload.</i>
<u>Error 8</u> Students gave incoherent answers.	Explain how Pumela's socio-economic status (SES) may impact on her emotional and physical wellness.	This error is often a result of an inability to structure answers at the sentence surface level; for example, the incorrect use of connectors. <i>Her SES is not high so she cannot treat any physical problems readily and emotionally it is not impacting but she is happy with the family and enjoys taking care of others although she plans to retire soon but she is still physically suffering as a result</i>
<u>Error 12</u> Students gave irrelevant detail.	Outline the emotional experiences (psychological) that Michelle may be experiencing during her pregnancy.	Instead of focussing on emotional experiences during pregnancy, students added a substantial portion on physical experiences. In addition, they provided evidence for their statements by adding irrelevant detail in the form of examples taken from their own lives. This error might be related to students' experience of PBL. In the first PBL session students need to draw on prior knowledge, which often gets confused with drawing on "anecdotal evidence".

		<p><i>Michelle is feeling anxious about her pregnancy and she worries if she will be a good mother or not. She has mood swings and become easily irritated. She is also experiencing nausea in the morning and her breasts become tender and swollen. It is important to respect a person's body if they are pregnant as I have seen how people walk up and touch a person's stomach to feel if the baby is growing. Michelle's friends must respect her.</i></p>
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v. *Counting errors*

The next step in analysing the errors involved counting how many students made the same type of error, as identified in the previous section. The purpose of this part of the study was to identify the most common errors made by students, which in return could link with Part Two of the study. An awareness of the most typical mistakes made by students facilitates observation of how mediation is addressing the underlying cognitive skills in order to move students closer to their potential level of development. Chapter Five will discuss results from counting errors in more detail.

vi. *Subsuming particulars into the general*

Miles and Huberman (1994) suggest the process of clustering and counting errors should be followed by asking whether these clusters belong to a more general class. They refer to this process as “subsuming particulars into the general” (pg 255). In this case an attempt was made to link clusters to Feuerstein’s (Feuerstein et al, 1980) categories of cognitive difficulties in order to identify underlying reasons for students’ underachievement. This process should not be seen as a conclusive exercise. It is an approximation of the cognitive difficulties experienced by students during an assessment in order to facilitate a general understanding of participants’ academic underachievement before they enter an intervention programme. Results of this process are discussed in Chapter Five.

vii. *In summation*

In an attempt to analyse typical errors made by students a first impression of the data indicated that participants experienced difficulty during various stages of the answering process. They did not have access to the correct information to start answering the questions, they struggled with thinking processes whilst finding solutions to problems and they had difficulty composing their answers. An initial plausibility was made that these difficulties could relate to the Psycho-social module, underlying cognitive difficulties and/or academic literacies. Errors were then classified into three clusters. These clusters confirmed that participants had difficulty accessing the correct information, processing the information and

formulating coherent answers. The fourteen errors were then linked to Feuerstein's categories of cognitive difficulties in order to explore more abstract relationships between errors and existing cognitive measures and theory. Results from this process are discussed in Chapter Five.

4.4.2. Observational data

Three teaching situations of two hours each were video recorded and transcribed as a method to analyse data in order to explore the sub question regarding ways in which the Intervention Programme scaffolds learning activities. Adler and Adler (1994) define observation as noting and recording a phenomenon for scientific purposes. One of the characteristics of this method is that the researcher does not intervene and manipulate the subjects. For that reason I obtained permission from the lecturers and students to record them in their natural context in order to witness and record possible connections and correlations. This agrees with Silverman's (2001) comments that the aim of observations should be to gather an authentic understanding of people's experiences to ensure rigor in the study. For one of the activities, a Psycho-social tutorial, I observed myself by setting up the video recorder in a corner. In this instance I was not a participant observer, as I observed my own behaviour as a tutor, and did not intervene with the process of observation for the duration of the tutorial.

Observation as a means to analyse data can be problematic as validity and reliability are issues. Denzin and Lincoln (1994) warn that the observer has to rely more on his/her own perceptions, and therefore is susceptible to bias or subjective interpretation of the situation. To overcome this problem I attempted to give a full and coherent account of my observations, specifically with regards to observing myself. Peattie (cited in Flyvbjerg, 2006) states that the researcher can guard against bias by giving an in-depth description of the observations, as opposed to just a summary. Atkinsons (cited in Adler and Adler, 1994) agrees that a coherent account, where plausibility, factual text and own experience are combined, can ensure authenticity. Validity and reliability of this method are addressed in more detail later in this chapter.

Step one – selecting the setting

Based on guidelines provided by Adler and Adler (1994), the first step in collecting and analysing observational data involves selecting suitable settings. Because Part One of the study focussed on analysing problems students experienced with the Psycho-social module, I had a theoretical interest in observing how mediation happens in teaching situations addressing psycho-social concepts. I therefore selected the learning unit addressing the psychological and social concepts of middle and old age, and observed a PBL session introducing students to this unit, a Psycho-social tutorial where concepts from this unit were made clearer to students, as well as an Academic Literacy lecture where reading and writing skills were addressed within the context of these concepts. Different teaching and learning methodologies are inherent to each of these educational activities. One could surmise that the task at hand from each situation would expect and demand different cognitive and metacognitive competencies from students. The sub-question asked for this part of the study therefore set about analysing data to see whether mediation, as a “universal principle” to all three activities, was present in the scaffolding of students’ learning. Each observation was therefore a concentrated inquiry into a single phenomenon, mediation, in three different educational contexts.

Step two – recording the sessions

The second step involved the actual recording. Jorgensen (1989) suggests that observations should be descriptive in nature, starting off with a broad overview and shifting towards more focussed and selected observations. I therefore started off by recording a few sessions that I did not intend using for the study in order to get a sense of the areas I wanted to focus on and to try and prevent the students and lecturer seeing my presence as an intervention of the teaching situation. Once students and lecturers became familiar with my presence in the class, I became more selective in recording the Academic Literacy lecture, PBL session and Psych-social tutorial. I also did this with regards to observing myself, to accustom myself to the role of the observee.

Step Three – analysing the data

In order to complete the third step, an analysis of the transcribed data, I drew on Rein and Schon (in Miles & Huberman, 1994) who suggest that the analyst moves from a “grand theory” with a few well articulated constructs towards a “map” that identifies patterns and generalizations. The framework in Figure 4.1. outlines how this part of the research drew on the theoretical framework outlined in Chapter Two to deduce from techniques and teaching strategies used in the Intervention Programme any examples of mediation. Yin (1991) argues that a predicted pattern of events should be compared with patterns emerging from the observations.

This was done by drawing on Yin’s (1984) framework:

- 1) I started off with a solid understanding of the theoretical framework described in Chapter Two. Three central concepts of mediation were drawn from the theory: mediating meaning, intentionality and reciprocity and transcendence. In this study these three principles were operationalised in the following ways, outlined in table 4.4.

Table 4.4: Operationalising principles of mediation

Concept	Definition	Examples from the data
Meaning	Meaning is the process of turning implicit reasons for learning into something explicit, so that the mediatee understands the significance of the process (Feuerstein et al, 1991).	<p>In the observed PBL session the facilitator asked students to reflect on their own lives to understand the relevance of religion and spirituality. She used questions to promote a deeper understanding of the concepts, as opposed to rote learning.</p> <p>Facilitator: <i>Can anybody tell me in their own words what they understand spirituality is?</i></p> <p>Student 4: <i>Transcending to a higher stage. It gives you hope and creativity and something else.... You acknowledge a higher power. Something like that.</i></p> <p>Facilitator: <i>OK, so let's start with an example that we can all understand from our own lives. Give me an example of spirituality from your own life?</i></p>
Intentionality and reciprocity	Intentionality and reciprocity refer to the mediator's ability to focus on the needs of the learner and to then develop and shape the activity in such a way that it meets those needs of the learner (Feuerstein et al, 1991).	<p>In the observed Academic Literacy lecture the lecturer used a question to demonstrate to students that there were underlying strategies involved in the learning activity. In this case students reciprocated by looking for constructive ways to identify the strategies, as opposed to a trial and error response</p> <p>Lecturer: <i>How can you avoid leaving out easy questions? If you leave out questions, you lose marks. How can you avoid that?</i></p> <p>Student: <i>Manage time better</i></p> <p>Lecturer: <i>What does that mean in practice?</i></p>

		<p>Student: Calculate the marks and time? Glance at the paper.</p> <p>Lecturer: What about deciding which question is the easiest?</p> <p>Student: How do we know which one is the easiest?</p> <p>Lecturer: Could there be clues in the question itself?</p>
Transcendence	Transcendence happens when the mediator is going beyond the specific and primary goals of the learning interaction to provide the student with opportunities to increase his/her cognitive range (Feuerstein et al, 1991).	<p>In the observed Psycho-social tutorial the lecturer used a question to demonstrate to students how a specific example of arriving at multiple conclusions could be applied as a general principle in a Psycho-social module.</p> <p>Lecturer: Do we have any guarantees in psycho-social that things will always work out that way for everybody?</p> <p>Student: No, but we can speculate. If the case says that he is having an affair, we can see that his life is going in a different direction. So we can speculate what is going on in his head.</p> <p>Lecturer: What do we do if we want to speculate in our writing?</p> <p>Student: We can say "could" and "maybe". It could be that he is confused. Or immature. And then write all that stuff from Marcia. And then say that he appears to be immature if we compare and contrast it with the theories.</p>

- 2) The next step involved a description of three observed teaching interactions to identify mediation techniques used by the lecturers. That is, drawing on the concepts elaborated in table 4.4, the data were analysed for empirical incidences of these concepts. The point here was to investigate how these types of mediation played themselves out in actual, empirical instances.
- 3) I then did a cross case analysis of the three observed activities to identify patterns of mediation. Ragin (1978) suggests the researcher should analyse the data to look for comparisons and underlying similarities so that systematic associations can be identified with regards to the main outcome variable.
- 4) Finally I built a logical chain of evidence to explore the role of mediation in the three activities.

The four steps outlined above illustrate how researchers move from a theoretical understanding of a concept, to an articulation of how this concept plays itself out empirically before moving back to the theory to plot the coherent thread from the articulation of the concept, through its analysis and back to theory.

4.4.3. Interviews

Although this study did not undertake to evaluate the impact of mediation in the programme, interviews were used to explore students' experiences of the learning and teaching activities in the Intervention Programme. I wanted to explore whether students were now more aware of the cognitive difficulties they experienced before they entered the programme (actual level of development), and whether they have become aware of certain teaching strategies that contributed to their potential level of performance (mediation).

Accordingly, the aim of an interview as research methodology is to gather an authentic understanding of people's experiences. Silverman (2001) suggests that open-ended questions are the most effective route to gain a real understanding of people's experiences of a certain phenomenon. Through interviews the researcher can thus gain a deeper understanding of variables at stake in the research question.

According to Silverman (2001) an interviewer should ask him/herself whether interview data really help in addressing the research topic. He also suggests that researchers decide beforehand what status they wish to attach to interview data. In response to Silverman's (2001) suggestions I have used interviews to gain an understanding of students' metacognitive awareness of their experiences before and during the programme. The interview data is therefore not my principal data, but analysed to link with findings from the error analysis and observations. Silverman (2001) suggests that the relationship between the interviewer and interviewees should be well understood. In this case an open-ended approach was followed, but questions were structured beforehand. It was therefore neither an informal conversation nor the discussion of a formal topic. I interviewed the ten participants for 45 minutes each after six months in the programme. Students could respond for as long as they wanted, and I only interrupted them to clarify their statements.

Participants were asked the following questions:

1. Why do you think you were unsuccessful in semester one?
2. How has your performance in IP changed from your performance in mainstream?
3. Can you give me an example of an activity or an interaction with a lecturer that enabled you to understand work better as opposed to last semester?
4. How do you think your experience in IP could contribute towards your readiness to rejoin mainstream?

As in the case of the observation, pattern classification was applied to analyse the data from the questions. Results are outlined in Chapter Six.

4.5. PARTICIPANTS IN THE STUDY

Yin (1984) argues that the propositions of a research study will guide the researcher towards the data he/she needs to collect. To ensure rigor, he states that it is imperative to define and explain the people in the study and to distinguish them from outsiders.

Three lecturers and ten students participated in the study. The lecturers were selected based on their involvement in three different teaching and learning situations in the Intervention Programme. The three activities, comprising a tutorial, a problem based session (PBL) and a lecture, were observed, video recorded, transcribed and analysed to identify examples of mediation.

Ten students who entered the Intervention Programme in June 2006 were identified as the unit of analysis for the collective case study. These students were selected based on “at risk” factors and because they failed the course HUB 1006F (Life Cycle) at the end of their first semester. The “at risk” factors are outlined in Chapter Five. HUB 1006F is a semester course in the first year MBChB curriculum. Exam scripts from these ten students were selected for an error analysis on the basis that these students failed HUB 1006F. HUB1006F introduces students to the whole person via the bio-psycho-social model by using the human life cycle as a theme. Students are introduced to key physical, psychological and developmental factors that shape human life from conception to death. Exam questions for this course are constructed from two modules, Psycho-social and Human Biology.

In addition to HUB1006F all first year medical students also take Chemistry (CEM1011F) during their first semester. This course introduces students to the key foundational concepts of chemical theory, and is designed specifically for first year medical students. Students who are unsuccessful in either courses, Chemistry and/or Life Cycle, enter the Intervention Programme (HUB 1010S) where the key concepts of these disciplines are revisited. In the Intervention Programme there are therefore three sets of students: those who failed HUB1006F only, those who failed CEM1011F only and those who failed both subjects.

The reason for selecting participants who were unsuccessful in HUB1006F, and more specifically in the Psycho-social component of the course, was based on two issues:

- 1) A broader range of academic competencies and skills are obtainable from the Psycho-social scripts in the HUB1006F course in order to do an error

analysis, as the assessment methodology of this course is case-based with short written answers. In the CEM1011F course the assessment method comprises multiple choice questions.

- 2) With regards to ethical clearance for the study, it was less problematic to gain access to HUB1006F and Intervention Programme teaching and learning materials, as the courses are situated in the Faculty of Health Science.

The ten students were also observed during the three learning activities, and interviewed after completing six months in the programme in order to gain insight into their learning experiences, as opposed to their mainstream experience. Table 4.5 is a demographic representation of the student participants.

Table 4.5: Demographic representation of participants

Students	Gender	Matriculation exam authority	Race	Age
Student 1	F	Eastern Cape	Black	19
Student 2	F	KwaZulu Natal	Black	20
Student 3	F	Free State	Black	18
Student 4	F	Gauteng	White	19
Student 5	M	KwaZulu Natal	Black	19
Student 6	F	Eastern Cape	Black	19
Student 7	F	Western Cape	Coloured	18
Student 8	F	KwaZulu Natal	Black	18
Student 9	M	KwaZulu Natal	Black	20
Student 10	F	Mpumalanga	Black	18

4.6. RELIABILITY AND VALIDITY : TRIANGULATION

The goal of any researcher is to design a study free from potential biases, with strong built-in internal and external validity and reliability (Thurmond, 2001). Hammersly (in Silverman, 2001) defines reliability as “the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions (pg 225). Validity is defined as truth;

interpreted as the extent to which an account “accurately represents the social phenomena to which it refers” (pg 232). Frances Bacon (in Flyvbjerg, 2006) states that “it is a peculiar and perpetual error of human understanding to be more moved and excited by affirmatives than negatives” (pg 234). To guard against this kind of subjective bias, to ensure reliability and validity and to provide a multiple perspective on a study, Denzin (1970) suggests a procedure called triangulation.

Triangulation is a procedure to reduce the likelihood of misinterpretation. It involves the combination of two or more data sources, investigators, methodological approaches and theoretical approaches within one study (Denzin, 1970). Denzin & Lincoln (1994) suggest that the researcher combines various procedures in order to offer multiple interpretations that will lead to clarification and redundancy of biases with regards to observation or interpretation. When the researcher uses more than one type of triangulation, for example two or more data sources along with two or more methodological approaches; the process is referred to as multiple triangulation (Denzin, 1970). Flick (in Denzin & Lincoln, 1994) argues that a combination of methods, empirical materials and observers all add rigor to a study. Thurmond (2001) cautions that independent measures never relate completely to one another; for example, observations will not always link completely with interview data and sources can be conflicting. She argues that triangulation should therefore be used more as *a mode of inquiry* to guard against researcher effects and biases. Lincoln and Guba (1985) argue that unless data and information have come from a reputable source, it should never be given serious consideration except if it can be triangulated. In this dissertation I have attempted to adhere to these principles of triangulation by using more than one type of triangulation and by ensuring that multiple sets of data were collected from dependable sources.

Denzin (Denzin & Lincoln, 1994) has identified four types of triangulation: data triangulation, investigator triangulation, methodological triangulation and theory triangulation. Kimchi, Polivka & Stevenson (1991) describe a fifth type of

triangulation called data-analysis triangulation, which I have incorporated under methodological triangulation.

4.6.1. Data triangulation

Data triangulation refers to the times of data collection, the setting and the source from which data was obtained (Denzin, 1970). The benefit of data triangulation is that the researcher has a comprehensive understanding from various angles because different sets of data can be compared and contrasted.

In the dissertation qualitative and quantitative data was collected. Qualitative data included interview and observation data, while quantitative data included scores from cognitive tests done by students. Data was collected using three different sources: documents, audiotapes and video recordings. Video recordings and audiotapes were transcribed by me to ensure an authentic understanding of the process. To ensure an authentic representation of the data, I did not correct semantic mistakes.

In collecting data from various sources I attempted to collect detailed and rich material that would enable me to give explicit attention to the research design. Denzin (Denzin & Lincoln, 1994) suggests that the “thicker” the description, the better the chances of a “thick interpretation”.

4.6.2. Investigator triangulation

Investigator triangulation refers to using more than one observer, interviewer or data analyst in the study. Confirmation of data among investigators, without prior discussion or collaboration with one another, lends greater credibility to the observations (Denzin, 1970). The benefit of using more than one investigator is to lessen potential bias (Denzin, 1970). Lincoln and Guba (1985) add that multiple investigators can increase the credibility of findings. In the dissertation I have used experts from the Psycho-social discipline in the mainstream MBChB programme to confirm errors I identified from the scripts. I gave the course convenor examples of errors made by students and asked him to match the errors

with the fourteen categories of errors I identified. That was done to confirm my initial hypotheses that errors can be classified into specific categories.

Investigator triangulation is often recommended as a strategy because not many researchers are skilled in conducting both qualitative and quantitative research (Polit & Hungler, 1995). This was also the case in this study. Data from the pre- and post- SRT and PTEEP test were prepared and explained to me by staff from the Alternative Academic Research Project.

4.6.3. Theory triangulation

Theoretical triangulation refers to the use of multiple theories or hypotheses when examining a phenomenon (Denzin, 1970). The purpose of theory triangulation is to conduct a study with multiple lenses. The role of theory in research is to allow a steady and explicit dialogue between ideas and evidence (Ragin, 1987). Multiple perspectives can also eliminate premature acceptance of plausible explanations and develop confidence when developing constructs based on theory (Thurmond, 2001).

In this study I drew on the work of Vygotsky and Feuerstein's theories on mediation. Mitchell (1986) argues that using more than one theoretical perspective can decrease alternative explanations for a phenomenon. I am aware that data analysed in this study could point towards alternative explanations and that there is always the possibility of researcher effects, causing a bias in the results. Miles & Huberman (1994) caution the researcher to identify and rule out spurious relationships. All of the above have been addressed by using theory triangulation. By approaching the study from two theoretical perspectives I intended to rule out rival explanations. In linking the two theoretical perspectives with a multi-method approach I attempted to ensure rigor, thus increasing confidence in the findings.

4.6.4. Methodological triangulation

Lincoln and Guba (1985) state that methodological triangulation can refer to either data collection methods or research designs. By using multiple methods, the researcher attempts to decrease the “deficiencies and biases that stem from any single method” (Mitchell, 1986, pg 19). According to Denzin and Lincoln (1994) the use of multi method research reflects an attempt to secure an in-depth understanding of the question.

In this study a multi-method approach was used to collect data. Observation, documentation and interview data were collected and analysed. The value of analysing documents and texts as part of methodology is that it corroborates results as well as provides a neutral angle to overcome bias of interpretation, especially if it stems from a formal source (Lincoln & Guba, 1985). Hodder (1994) suggests that text be used alongside other forms of evidence so that particular biases of interpretation can be overcome. In this case documentation and text were analysed to gain a better understanding of difficulties students experienced in semester one, as well as the reasons for their unsatisfactory performance in the mainstream course. The analysed data was then corroborated with interview data.

In the dissertation interview data were not used as the major data source, as I was aware of multiple meanings and perspectives of a given situation. I was also acutely aware of the possibility of researcher bias, as I have a vested interest in the Intervention Programme. It was therefore quite possible that my questions and position as lecturer in the Intervention Programme could influence students' comments. Data interview analysis was done after the error analysis and case study analysis to prevent bias.

Data from observations of the three learning situations were analysed to ensure more rigor in the study. According to Silverman (2001) a great strength of observation is the fact that it does not require direct interaction with participants. I tried to achieve this even in the case where I observed myself. In all the cases I

informed students and lecturers of the study, and recorded a few sessions that were not used for analysis in order to ensure lecturer and students were comfortable with the video camera present in the learning situation. Silverman (2001) states that observation can produce great rigor when combined with other methods, and for that reason observation data was combined with interview data to gain insight into the mediation practises in the programme.

In addition to collecting and analysing three types of data, methodological triangulation was also used with regards to the research design. In this study an inductive and deductive approach were followed to answer the research question. In the inductive part of the research Miles & Huberman's (1994) suggestions for analysing data were applied. To reduce the likelihood of misinterpretation, Miles and Huberman (1994) suggest various procedures, including eventual redundancy of data in order to lead to theoretical coherence. This method was applied in the study to gain a better understanding of students' actual level of performance as they entered the Intervention Programme.

The deductive part of the study involved drawing on existing theory to identify patterns from a collective case study. Silverman (2001) points out that prejudices against the case study include lack of rigor and little basis for scientific generalisation. That is why a deductive approach was selected for this part of the study; the observations are only generalisable to theoretical propositions and not to populations and universes (Silverman, 2001). The goal of the study was not to enumerate frequencies, but to describe patterns across all three activities that pointed towards the theoretical framework outlined in Chapter Two. Kimchi, et al. (1991) refer to the different ways of analysing data as data-analysis triangulation. Data-analysis entails the combination of two or more methods to analyse data (in this case the error analysis and observational data).

In conclusion, Miles and Huberman (1994) have generated guidelines with regards to ensuring data quality. Through the process of triangulation I have attempted to apply these guidelines.

- 1) To overcome researcher effect I used observation as an unobtrusive measure and I ensured participants knew why I was there.
- 2) To ensure proper weighting of the evidence I triangulated stronger data with weaker data.
- 3) To rule out spurious relations I used theory with methodological and investigator triangulation.
- 4) To ensure replication of findings I used a collective case study to identify patterns.
- 5) To limit rival explanations I used theory triangulation.

4.7. IN SUMMATION

This chapter outlined the research design and empirical methods used to explore the research question. A collective case study, comprising an error analysis, observations and interviews was used to approach the study from an inductive and deductive angle. In all three cases patterns were identified and linked with the theoretical framework outlined in Chapter Two. Four types of triangulation were used to ensure validity and reliability; however, the very nature of qualitative research hinges on reality being viewed from a particular perspective. To represent reality the researcher can observe a particular setting, but never completely reproduce the findings to resemble exactly what was observed. This dissertation can therefore attempt to describe learning moments at a given time with given results, which corroborated with theory on mediation and the ZPD, but not necessarily generalise the findings to a universal setting. It can however contribute to a similar research context by suggesting a framework for exploring mediation in an academic development programme for educationally disadvantaged students.

CHAPTER FIVE

RESULTS I: ERROR ANALYSIS AND PRE-AND POST-TEST RESULTS

5.1. INTRODUCTION

This chapter starts off by outlining results from admission and exam scores to indicate students' actual level of academic development as they entered the Intervention Programme. This was done to illustrate the notion of "at risk". Results from the error analysis follows to elucidate why students experienced academic and cognitive difficulties during semester one in the mainstream course. Results from pre- and post- SRT and PTEEP tests, as well as results from an error analysis done after one semester in the Intervention Programme, demonstrate the impact of the Intervention Programme on initial underachievement.

5.2. IDENTIFYING "AT RISK" FACTORS

Table 5.1 is a summary of admission and exam scores of the ten students selected for this study. "At risk" factors, as outlined in Chapter Three, are highlighted (in bold), while factors where students are not potentially "at risk" are in italics. The categories are explained below.

Table 5.1: "At risk categories"

					Pop	O/all	Pop	O/all
	HUB1006F	CEM1011F	⁶ Matric ualtion	QL score	PTEEP	PTEEP	SRT	SRT
Student 1	49	46	40	34	5	9	10	10
Student 2	48	37	40	31	2	6	9	5
Student 3	48	46	42	35	8	10	9	7
Student 4	46	48	48	76	5	4	2	2
Student 5	45	48	43	40	10	10	10	10
Student 6	49	47	40	71	3	7	5	2
Student 7	49	48	39	65	3	4	5	4
Student 8	40	48	39	42	4	8	9	7
Student 9	42	64	42	45	7	10	8	4
Student 10	43	45	41	45	9	10	10	9

⁶ This is the result obtained on the school leaving examination calculated as number of points. As noted earlier, points are assigned to percentages obtained in particular subjects and students are given access to University based on these points.

Categories of “at risk” factors

As was outlined in Chapter Four, ten students were selected on the criteria that they failed the course HUB 1006F (Life Cycle) at the end of their first semester. The final mark, as seen here in column 2, was derived from a 40% allocation of in-course marks and a 60% allocation of exam marks, with a pass mark of 50%. All ten selected students therefore failed the course. Exam scripts from the Psycho-social component of this exam were used in the error analysis. Column 3 reflects the final marks for CEM 1011F (Chemistry). In addition to HUB1006F students also take Chemistry (CEM1011F) during their first semester. The final mark was calculated from in-course assessments (45%) and a final exam in June (55%). In order for students to pass, they needed to obtain a pass mark of 50% in both the exam and in-course assessments. Only one student (student 9) was successful in CEM1011F, whilst nine of the participants failed the course. Column 4 reflects the matriculation scores of the participants. Based on literature regarding entrance and selection criteria, reviewed in Chapter Three, Column 4 demonstrates that only two students (students 4 and 5) would not have been pre-selected to join the Academic Support Programme of the old curriculum, based on an assumption that they needed additional support in order to pass their course. Column 5 reflects the quantitative literacy scores of the participants. Prince, Frith and Jaftha (2004) have indicated that a score of less than 70% indicates that a student requires additional support to meet the quantitative literacy skills of mainstream courses. It can be surmised that only student 4 and student 6 demonstrated mathematical competency that did not require additional support to meet the academic demands of the first year course. Reflected in columns 6 - 8 are the scores from the Placement Test in English (PTEEP) and the Scientific Reasoning Test (SRT). Both tests reflect two scores: a score based on writers from comparable educational backgrounds (indicated as “Pop” in Table 5.1) and a score from the total pool of writers (indicated as “O/all” in Table 5.1). According to Cliff and Hanslo (2005) studies have indicated that ranking within the top four deciles indicates that students are recommended for selection. Columns 5 and 6 show that for the PTEEP three students fell in the top four deciles when measured against their peers, and two students in the top four deciles when compared with

the overall population group. The majority of students would therefore have benefited from additional support as their scores indicated that they were potentially “at risk”. Columns 7 and 8 reflect the scores from the SRT and indicate that one student fell in the top four deciles when compared with peers, and four students fell in the top four deciles when compared with the overall population group. As in the case of the PTEEP, the majority of students were therefore potentially “at risk” when applying criteria discussed in Chapter Three.

In summation

The scores from Table 5.1 demonstrate that the majority of the participants in this study were potentially “at risk” during semester one in the mainstream course based on marks, school performance and scores from a range of cognitive assessments. With reference to Vygotsky’s concept of the ZPD (Vygotsky, 1978) it could therefore be hypothesised that students with “at risk” profiles would benefit from a mediation process which moves them from their actual academic development to their potential level of development. This will be discussed further in Chapter Six.

5.3. RESULTS FROM THE ERROR ANALYSIS

The second set of results was derived from the error analysis to indicate why students experienced academic and cognitive difficulties in the Psycho-social component of the June exam before they entered the Intervention Programme. Chapter Four outlined the methodology of identifying, describing and clustering the errors. This part of the dissertation presents results from counting the errors and linking them to Feuerstein’s categories of cognitive difficulties to explore their significance in relation to cognitive functioning and underachievement.

Counting errors

Analysis of errors involved counting how many and what type of errors students made in their exam answers. The purpose of this part of the study was to identify the most common errors made by students, which in return could link with Part Two of the study. Part Two of the study focuses on the role of mediation in the

Psycho-social module of the MBChB Intervention Programme in addressing underachievement. Table 5.2 is a summary of the frequency and types of errors experienced by participants. Results from this table indicated that participants experienced a range of difficulties when engaging with the assessment tasks.

Table 5.2: Number of errors per category

	Err 1	Err 2	Err 3	Err 4	Err 5	Err 6	Err 7	Err 8	Err 9	Err 10	Err 11	Err 12	Err13	Err 14
Stud 1		X	X	X	X					X	X		X	
Stud 2	X	X	X				X	X		X		X	X	X
Stud 3		X	X	X	X		X	X	X	X	X		X	
Stud 4		X					X				X	X	X	
Stud 5	X	X	X		X	X	X	X	X	X	X		X	X
Stud 6	X		X	X			X	X		X	X		X	
Stud 7		X	X			X	X		X	X	X	X	X	X
Stud 8		X	X	X		X	X	X		X	X	X	X	X
Stud 9	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stud 10	X	X	X	X	X		X	X		X	X	X	X	X
Total	5	9	9	6	5	4	9	7	4	9	9	6	10	6

Table 5.2 indicates that the most common errors made by students included:

Error 2: Nine of the participants made the same error by only answering part of the question correctly, or leaving out detail.

Error 3: Nine of the participants made the error of not getting to the point.

Error 7: Nine of the participants failed to link their answers to theory, so the answers stayed superficial.

Error 8: Seven of the participants gave incoherent answers.

Error 10: Nine of the participants did not relate/link concepts.

Error 11: Nine of the participants did not elaborate or substantiate answers.

Error13: Ten of the participants, that is, all the students did not apply their knowledge to the paper case.

Linking errors to Feuerstein's categories of cognitive difficulties

In order to guard against bias and to ensure data triangulation, the fourteen errors were also linked with Feuerstein's (Feuerstein et al, 1980) categories of cognitive difficulties. These categories were discussed in Chapter Two. Again I want to stress that in this thesis data were not analysed in order to demonstrate "deficits" in students, or to highlight "low levels of cognitive performance", but rather to get

an idea of issues at stake in the zone of proximal development. In other words, why did the participants of this study demonstrate academic underachievement?

As part of the methodology of collecting and analysing data, errors were clustered into three groups in Chapter Four. Cluster one referred to errors relating to accessing the correct information. Cluster two described errors relating to processing information systematically and correctly. Cluster three outlined errors relating to constructing a logical written answer. Tables 4.1, 4.2 and 4.3 reported in Chapter 4 (pages 77 to 83), demonstrate how data were grouped into the clusters.

In cluster one participants selected incorrect information to answer their questions, attempted only part of the questions and/or left out questions. An underlying cognitive difficulty experienced by them could be what Feuerstein refers to as blurred and sweeping perception. When participants were asked to outline two theories, as well as explain the difference between them, they did not recognize key words in the question, which lead to an incompleteness of the data necessary for distinction and description of a problem. Hence their answer was incomplete (error 2).

Example: Students only answered the first part of the question; for example, they did not proceed to explain the difference between the two theories.

Sociocultural is the society around which you live or the culture to which you belong it can shape your gender identity. Epigenic is the genes and environmental factors that shape one's gender identity.

Blurred and sweeping perception could also be responsible for them selecting incorrect information (error 1) or leaving out a question (error 5), as they did not recognize details in the question to trigger the correct response.

Example: Students identified the incorrect parenting style, and therefore were not able to elaborate.

Authoritative. Children are more likely to be successful at school. They grow as happy people.

Impaired need for precision and accuracy could result in students selecting incorrect information (error 1) or leaving out detail (error 2). When participants were asked to use the paper case to answer a question, they did not experience the actual problem adequately and subsequently were not able to define it. They therefore selected incorrect information, such as the wrong parenting style (error1), or only answered part of the question; for example, only outlining the two theories instead of comparing and contrasting them (error 2). Another cognitive difficulty experienced by them could be unplanned, impulsive, unsystematic exploratory behaviour. When participants were asked to refer to theory in their answers, or apply theoretical knowledge to a paper case, they did not read the question properly or planned a systematic answer, hence leaving out detail (error 2) or selecting incorrect information from a body of knowledge to answer the question (error 1).

In cluster two participants experienced difficulties whilst processing information to compose a coherent answer. Apart from the cognitive difficulties already explored in the previous section, participants also experienced a lack of orientation towards the need for logical evidence. In error 7 participants did not explore a theoretical explanation for a person's behaviour, so their answers stayed superficial. Students were therefore unable to look for logical evidence from the case to explain the behaviour of the person and resorted to an "everyday" explanation of grief without any reference to theory (evidence). Hence the reference to "missing him a lot", or "crying a lot", instead of referring the Kübler Ross's five stages of bereavement.

Example: Students did not refer to the theory in the answer, instead gave a very superficial overview of emotions people experience after death, for example "crying a lot" or "missing him a lot".

Jean is first very sad that her husband died. She is also crying a lot and missing him a lot. She cannot believe he is really dead and she cannot accept his death. Jean is not coming to terms with her bereavement and not going through all the steps of death.

In error 14 participants made sweeping statements without providing enough evidence. This could refer to restricted, inferential, hypothetical thinking. In the Psycho-social module students are constantly expected to apply inferential and hypothetical thinking; for example, “*Explain how Pumela’s socio-economic status (SES) may impact on her emotional and physical wellness*”. Students were expected to find evidence in the paper case indicating Pumela’s socio-economic status (SES) to construct logical inference indicating the impact of SES on her emotional and physical wellness. However, participants resorted to speculation and used phrases such as “*She has a low SES and it impacts negatively in her physical health*”. Note how their choice of words is indicative of facts, instead of inferential and hypothetical thinking.

In error 14 participants were asked to use the paper case to identify factors indicating ageing and then to hypothesise whether the person is ageing successfully. In order for them to do that, they needed to draw on various developmental theories. From the participant’s response in table 4.2 it is evident that she did not identify enough evidence from the case to hypothesise. She was also not applying her knowledge to theory, and simply speculated about ageing in general. Once again her choice of words; “*She accepts it and grows old successfully*”, had a factual undertone rather than inference. A more correct answer would have stated that, based on evidence, there is a *possibility* that she might age successfully.

Example: Students speculated how Jean’s involvement in charity work would impact on her education (speculation) or discussed how certain processes of ageing are “normal” without providing evidence.

Jean is getting involved in charity and therefore she is becoming creative.

Creativity is good for her, as it will give her a reason to learn. If she learns more, even if she is old, she can still improve her life. Then her mental health is also getting better because she stimulates her brain with new things.

Even if Jean is not doing all the things she must do to age successfully, this is normal for old people to start forgetting things and for their friends and family to stop visiting so much. Her friends are all dying, but that is part of growing old. She accepts it and grows old successfully.

Participants also experienced cognitive difficulties with relating two sources of information at once. In error 10 participants were asked to link developmental

factors to successful retirement. Table 4.2 indicates that participants were not precise and accurate in gathering the necessary information to solve the problem. Instead, participants treated their answer as two separate entities, and could not perform the action of identifying the factors and then linking them to reach a conclusion.

Example: Students selected four factors from a list they studied, and did not relate it to the next part of the question.

Attitude of others determines how soon you will retire. Health. If you get a terminal illness, or backache, you will retire sooner. SES: Your socio-economic status like your education, income and job.

Financial security, like a retirement fund and outstanding debt.

Harry has to adjust to his retirement and various factors make him come to the decision.

Trial and error, another cognitive deficit⁷, was also used by participants in most of the errors. Typically participants were unable to apply their knowledge to the paper case, or to deduce from theory, so they simply regurgitated arbitrary information. Error 13 is a good example of trial and error where the participant outlined two opposite developmental theories of successful ageing in the hope that one of them might be correct.

Example: In this example the student outlines two theories on ageing, but does not choose the most appropriate theory to link to the case.

Disengagement theory. Holds that a person's social sphere decrease with age, because of the way society allocate responsibilities. Traditional roles are unwilling and unavailable as friends die or move away, co-workers stop asking for help and children have families of their own. Activity theory shows the opposite. When you are active, people make time for you.

In cluster three participants experienced difficulty with constructing coherent answers. Underlying cognitive difficulties could be impaired verbal tools for communicating adequately elaborated responses. In error 3 participants did not get to the point and rambled on without reaching conclusion.

Example: Students would describe stressful factors in Harry's life, but failed to take the answer to the next level by addressing coping mechanism. Instead, the answer became rambling without any conclusions, going round in circles
Harry could do four ways to cope with his stress. He is working long hours and

⁷ Readers are reminded, again, that my use of the term "deficit" derives from a Feuersteinian usage, and should be seen as referring to under-developed cognitive structures rather than deficient ones. In this dissertation it refers to an inability to engage appropriately with academic text

he is the breadwinner. He worries about his family and his job is demanding. If Harry does not address his stress, his stress levels will increase. He needs to find to have coping mechanism to cope with stress in a healthy way. From the case this is not happening.

In error 12 participants gave irrelevant detail about their personal experiences of the question, whilst in error 11 participants did not substantiate their answers. This could be an indication that participants did not have the necessary semantic tools to elaborate adequately. It could also be an indication that participants had an impaired need for precision and accuracy when communicating responses.

Example: Instead of only focussing on emotional experiences, students added a substantial portion on physical experiences during pregnancy, with examples taken from their own lives.

Michelle is feeling anxious about her pregnancy and she worries if she will be a good mother or not. She has mood swings and become easily irritated. She is also experiencing nausea in the morning and her breasts become tender and swollen. It is important to respect a person's body if they are pregnant as I have seen how people walk up and touch a person's stomach to feel if the baby is growing. Michelle's friends must respect her.

In error 6 participants used incorrect terminology, which could indicate that they knew the answer, but did not have the necessary verbal tools to communicate their answer accurately.

Example: Instead of “ergonomic” hazards, students would refer to the concept as “economic” hazards. The descriptions of the concepts were however correct, so it appeared as if they were confusing terminology.

Harry: Personality hazard. He is developing stress that is due to long working hours, and not enough family time and work overload.

Applying Feuerstein's categories to the data indicated that students experienced a range of cognitive difficulties whilst engaging with the assessment tasks. As was mentioned in Chapter Four, linking the data with Feuerstein's categories should be viewed as an approximation of academic and cognitive difficulties experienced by participants in order to gain a deeper understanding of underachievement, as opposed to an exhaustive comparison between errors and his categories.

Building a logical chain of evidence

In order to get a broader perspective of results generated through identifying, interpreting and exploring the errors, the next step involved building an evidential trail by using a process of enumerative induction. Miles and Huberman (1994) define this process as “collecting a number and variety of instances all going in the same direction” (pg 261). Harman (in Ennis, 1968) defines it as follows: “enumerative induction infers from observed regularity to universal regularity or at least regularity in the next instances” (pg 524).

It is important to note that in recent years this concept has become controversial and problematic as philosophers argue that one cannot conclude an argument on a generalization. Popper (in Flyvbjerg, 2006) developed the concept of “falsification” as a more rigorous measure to guard against unscientific generalisations. He used the famous example of “all swans are white” to show that the observation of just one black swan demands further investigation from the researcher. However in this thesis I did not apply the concept of enumerative induction to prove a generalisation on the basis of my data. By connecting data thus far collected I was using enumerative induction to investigate the possibility of a chain of evidence.

My first impression of the errors made by the participants confirmed that students were unsuccessful in their exam as they made mistakes and as a result did not perform satisfactorily. They did not perform satisfactorily because their answers were incomplete, wrong or non-existent. A deeper analysis of the errors showed that participants experienced a range of typical difficulties with regards to incomplete and wrong answers. In order to interpret the data, errors were classified into three main areas: students struggled to recall and retrieve information, process information correctly in order to answer the question and respond coherently. Matching errors with Feuerstein’s (Feuerstein et al, 1980) categories of cognitive difficulties elucidated that underlying cognitive demands were present when having to perform an assessment task. Following the process of enumerative induction further, one could surmise that if students were made

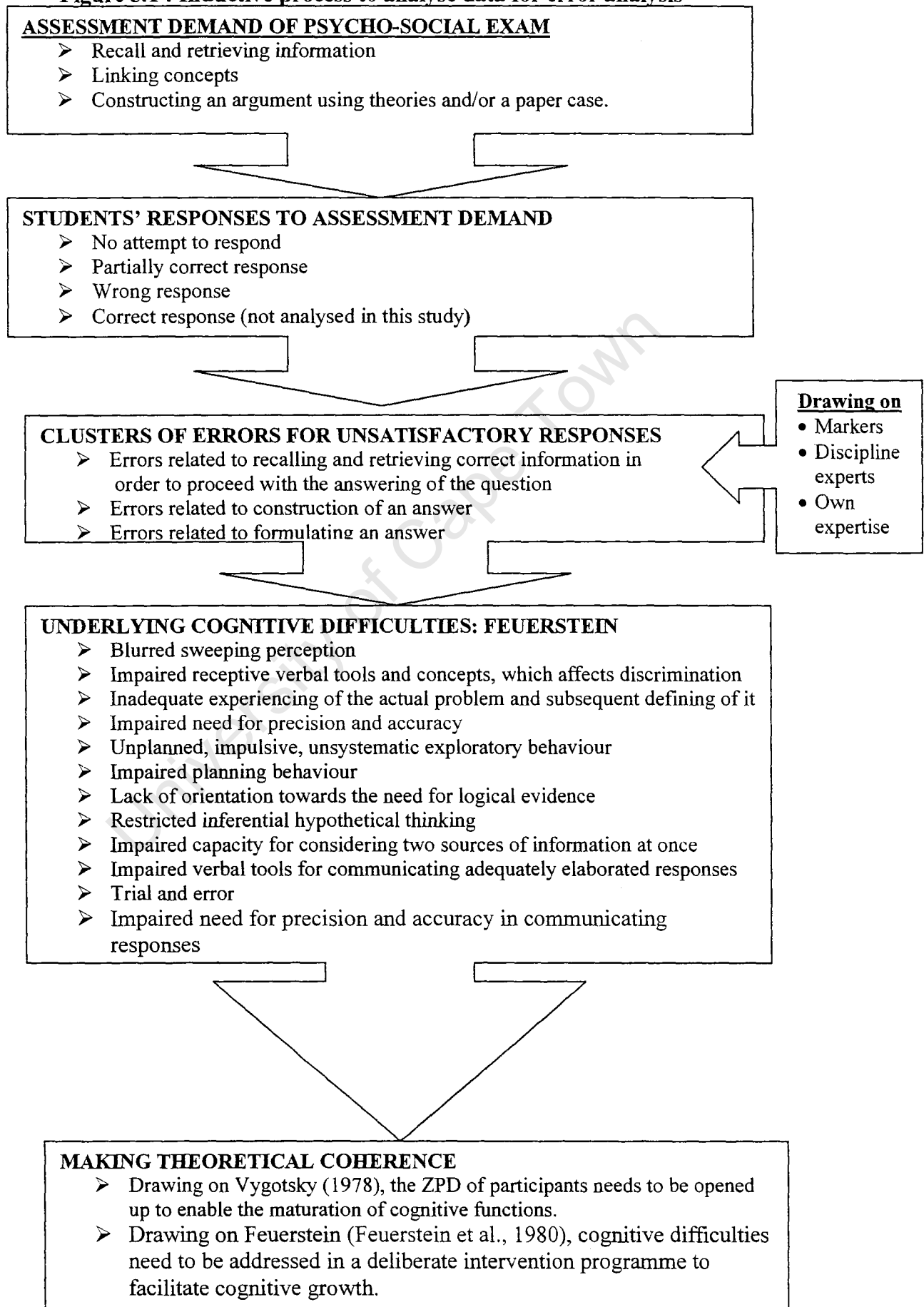
aware of ways in which they could utilise their cognitive abilities, they should move towards their potential level of development, with a bigger chance of performing satisfactorily

Making theoretical coherence

Chapter Seven discusses the results from the error analysis in detail; however, the final step in understanding the process thus far involved moving from the constructs identified towards existing theory. Miles and Huberman (1994) define this stage as the final stage where “we need to tie the findings of our study to overarching, across-more-than-one study propositions that can account for the ‘how’ and ‘why’ of the phenomena under study” (pg 261).

Drawing on the theoretical framework outlined in Chapter Two, one could surmise that participants’ cognitive functions in the ZPD needed to be strengthened and matured (Vygotsky, 1978). In order for participants to move from their actual development to their potential development, they needed to be guided to access cognitive functions that would enable them to perform successfully. Feuerstein (Feuerstein et al, 1980) refers to the process of structural change as cognitive modifiability where certain “deficient” cognitive functions are addressed in a very deliberate way. Drawing on the theoretical framework, Part One of the study has therefore demonstrated that in order to facilitate academic and cognitive change in students, they needed to be exposed to a deliberate intervention programme that will facilitate cognitive growth (Feuerstein et al, 1980). Figure 5.1 summarises the process of the error analysis in diagrammatic form.

Figure 5.1 : Inductive process to analyse data for error analysis



In Summation

Findings from the error analysis indicated that students experienced difficulties with answering questions posed on the Psycho-Social modular examination. An analysis of the errors indicated that these errors evidence features of Feuerstein's categories of cognitive functioning; with students, for example, evidencing features of blurred and sweeping perception when attempting to answer examination questions. The linking of Feuerstein's categories to an error analysis is novel and represents an achievement of this dissertation. The question I now turn to is an investigation of the impact that the Intervention Programme has had on 1) the errors students make in answering examination questions, 2) their scores on the PTEEP and 3) their SRT scores. The question becomes: to what extent has students' errors diminished over the course of the programme and is this evidenced in increased PTEEP and SRT post-test scores? Findings from this quantitative analysis will provide the basis for a qualitative investigation into how mediation, which is theorised as the driving force for learning in this dissertation, effects this change.

5.4. THE IMPACT OF THE INTERVENTION PROGRAMME ON STUDENTS' PERFORMANCES

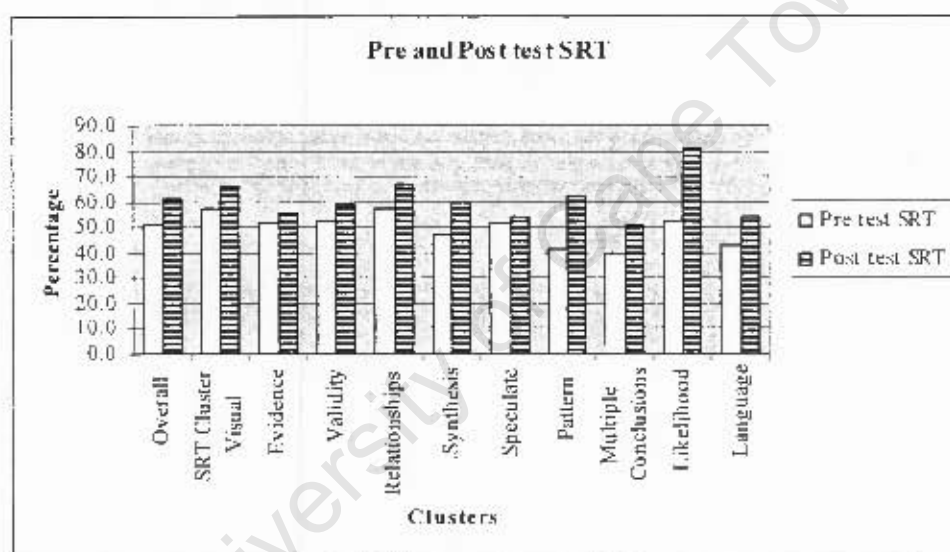
This part of the research comprised results from standardized cognitive tests, as well as results from a second error analysis to demonstrate academic and cognitive shifts after exposure to an Intervention Programme.

5.4.1. Results from pre- and post- SRT and PTEEP tests

Although this study did not evaluate the *impact* of mediation on students' performance, data sets from two pre- and post-tests were analysed to reflect on cognitive and academic shifts that occurred during the Intervention Programme. Actual scores of participants' pre- and post-tests can be found in Appendix IV and V. As was mentioned in Chapter Three, all MBChB applicants must write the PTEEP and SRT tests as part of selection criteria. The participants' results from these tests were therefore available. The same PTEEP and SRT tests were

administered at the end of IP Part One again in order to constitute a post-test. Results from these two tests were then compared. The sample was too small to justify a t-test, but individual clusters were qualitatively compared and contrasted to elucidate the impact of the Intervention Programme. It is important to note that quantitative analysis of the results was not performed for the purpose of this study as results would not have been relevant for the purpose of the thesis. Instead, I chose to describe the average achievement in all the clusters to gain insight into overall potential areas where students have strengthened their cognitive and academic skills.

Chart 5.1: Pre- and post SRT results



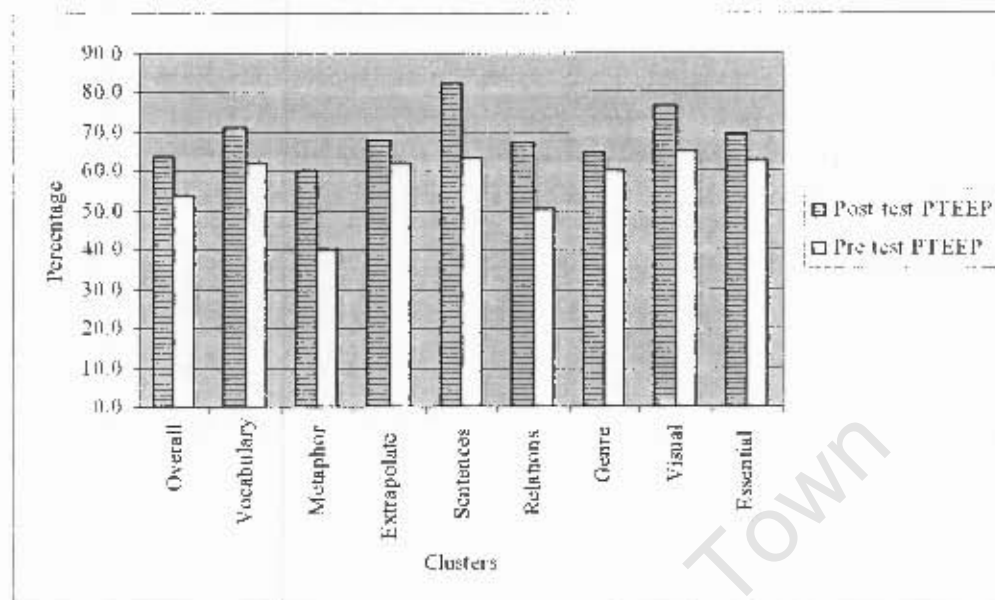
In the pre-test (SRT) the overall mean score of 51 (see Appendix IV) indicated that participants were academically potentially “at risk” and would benefit from support activities (Cliff & Hanslo, 2005). What one notices immediately is that all the clusters improved over the period of six months in the Intervention Programme. That is, the programme potentially impacted on these clusters.

The results from Chart 5.1 demonstrated that low scores were obtained in Multiple Conclusion, Synthesis, Language and Patterns clusters before the students entered the Intervention Programme. The Multiple Conclusions cluster refers to the ability to show “tolerance” that there is not necessarily one “right” answer. The fact that participants obtained low scores in this cluster explicated

why students experienced difficulty with the Psycho-social module, as opposed to the other science disciplines. The Synthesis cluster refers to the ability to understand the essence of what is of interest. Results from the observations and error analysis confirmed that participants struggled with this skill. The Language cluster refers to the ability to understand and assess the language of scientific reasoning and to understand the notion of precision and imprecision in language. Results from the error analysis confirmed that students had to strengthen their cognitive abilities with regards to semantic skills.

In the post-test (SRT) all clusters showed an improvement of performance, thus indicating the strengthening of academic and cognitive skills. The Likelihood cluster showed the biggest improvement, followed by the Pattern cluster. Drawing on results obtained from the error analysis done in this study, this indicated that students improved specifically with regards to understanding the concept of chance and exploring how concepts relate to one another to assess the likelihood that an event will occur. In the Psycho-social module this relates to an ability to compare information from the paper case with theory in order to deduce the likelihood of an event having an impact on a person's behaviour. An improvement in the Pattern cluster indicated that students were now able to recognise similarities and differences; in other words, they could use the "clues" from the paper case to compare and contrast knowledge. A more detailed exploration of these cognitive shifts will be given in Chapter Seven.

Chart 5.2: Pre- and post- PTEEP results



In the PTEEP pre-test the overall mean score of 53.8 (Appendix V) also indicated that students would benefit from support activities. Again, one notices improvement in the post-tests scores across the board, thus indicating the strengthening of academic and cognitive skills.

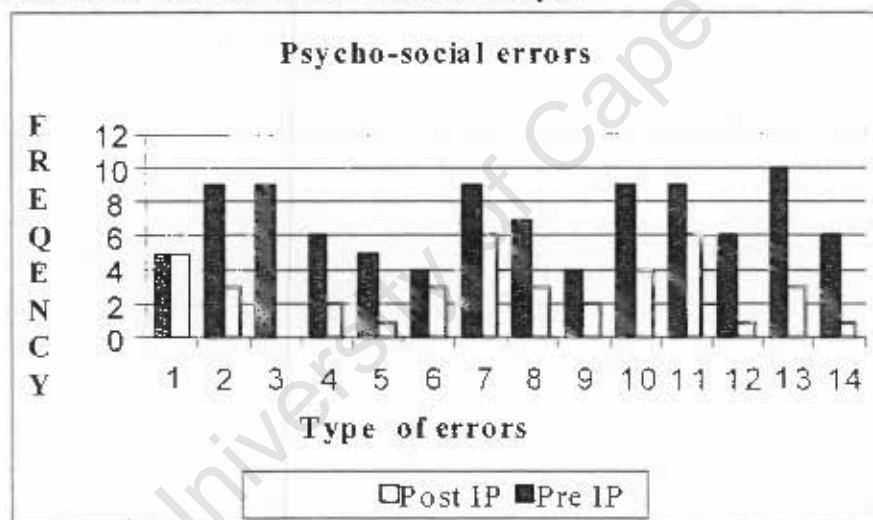
The Metaphor, Sentence and Relation clusters showed the biggest improvements. Drawing on results obtained from the error analysis done in this study, this indicated that students improved specifically with regards to addressing all aspects of the question, understanding the focus of the question, relating concepts, applying knowledge and constructing a logical and coherent answer. The Sentence cluster refers to students' ability to "see" how parts of sentences/discourse define other parts or are supports for arguments. One could therefore surmise that students strengthened their cognitive abilities with regards to formulating coherent responses by presenting logical evidence. The Relations cluster refers to the ability to recognize the structure and organisation of discourse and argument and to understand how an argument develops to lead to a logical conclusion. An improvement in this cluster indicated that students were now able to use text as a symbolic tool, which corroborates with students' comments during the interviews (Chapter Six), as well as observational data from the Academic

Literacy lecture (Chapter Six). A more detailed discussion of the results will be given in Chapter Seven.

5.4.2. Results from a second error analysis

For the purpose of this study the final Psycho-Social exam scripts of students who failed the course HUB1006F were analysed in an attempt to categorise typical mistakes and identify cognitive and academic difficulties experienced by students. At the end of IP1 the same exam questions were given to participants, but this time with a different paper case. Using the categories identified in the data analysis of the first error analysis, a second error analysis was performed to see whether any shifts occurred.

Chart 5.3: Pre- and Post IP error analysis



Results from the post error analysis showed a vast improvement with regards to all fourteen errors. Errors 2, 3, 10, 13 and 14 showed the biggest improvements. The finding in relation to error 13 is of particular interest. Readers are reminded that all the students made error 13 (not applying their knowledge) on the first error analysis. Based on data analysed in error analysis 1, this indicated that students improved specifically with regards to getting to the point, applying knowledge, answering all aspects of the question, relating concepts, eliminating irrelevant detail from their answers and avoiding speculation. Linking these results with Feuerstein's (Feuerstein et al, 1980) categories, this indicated that students developed and strengthened a range of cognitive functions that included

unplanned, impulsive, unsystematic and exploratory behaviour, impaired need for precision and accuracy, impaired planning behaviour, inability to select relevant, as opposed to irrelevant cues in defining problem and impaired need for precision and accuracy in communicating responses. The improvement of marks could also indicate that participants developed and strengthened their capacity for considering two sources of information at once and that they now have a better orientation towards the need for logical evidence. In answering Psycho-social questions pertaining to modality, one could surmise that inferential hypothetical thinking has developed, and that participants no longer settled for trial and error responses. With reference to the three clusters used to categorise errors, one could therefore surmise that students improved regarding approaching their work in a systematic manner in order to access the correct information, processing information correctly whilst preparing their answers and formulating coherent and logical answers.

There is a possibility that data from error analysis 2 could contain bias, as students were familiar with the work. However, the discussion in Chapter Seven will argue that mediation in the Intervention Programme contributed to the above mentioned shifts.

5.5. CONCLUSION

This Chapter discussed three sets of results. The first set of results indicated that all the participants demonstrated “at risk” academic behaviour and would therefore benefit from a scaffolded intervention programme. Results from the error analysis illustrated that the participants experienced a range of underlying cognitive difficulties. The next set of results demonstrated that participants shifted cognitively and academically after a period of intensive mediation. Results from the pre- and post- SRT and PTEEP tests showed that participants improved on all the clusters identified in this study. Results from a second error analysis showed that participants improved significantly as the frequency of all fourteen identified errors were reduced after six months in the programme. There is thus quantitative data to suggest that *something* has occurred over the period of the Intervention

Programme to strengthen students' ability to engage with academia. As was argued earlier in this dissertation, the notion of mediation as guided assistance is taken as a foundational concept for student development. The question that now needs to be investigated is: to what extent does the Intervention Programme incorporate mediation as a pedagogical strategy? Evidence of mediation in the IP will provide the basis for the conclusion that mediation, as a developmental strategy, provides a strong explanation for why students' academic engagement improved over the course of the IP. Chapter Six investigates the question of mediation within three teaching/learning situations on the IP.

University of Cape Town

CHAPTER SIX

RESULTS II: MEDIATION IN A PSYCHO-SOCIAL MODULE

6.1. INTRODUCTION

Chapter Five elaborated the types of errors made by students and went on to illustrate how these errors diminished after exposure to the Intervention Programme. Interventions in this programme are structured to guide students' academic access. In this chapter I address the notion of mediation as it plays out in the Psycho-social module. This chapter addresses the question of how mediation functions in the Intervention Programme. Given the positive gains recorded in Chapter Five, we might anticipate that mediation – guided assistance – is prevalent in the situations discussed here.

6.2. RESULTS FROM THE OBSERVATIONS

Part One of the study explored reasons why students were academically unsuccessful by using an inductive method to identify cognitive problems that could have contributed to students' underachievement. Part Two of the study consisted of the observation of three learning activities to explore the role of mediation in opening up participants' ZPD. This process used a deductive approach to gain a solid understanding of the theoretical framework described in Chapter Two, followed by individual descriptions of the three observed teaching interactions to identify mediation techniques. The three activities were then mapped out to interpret the role of mediation. A cross case analysis was done to identify similar patterns from each activity. Finally a logical chain of evidence was built between observational data and theory to explore the role of mediation in the Intervention Programme.

6.2.1. Theoretical framework

Feuerstein (Feuerstein et al 1980) and Vygotsky's (1978) notion that an intensive period of mediation can lead to cognitive shifts was used as the overall theoretical framework to observe a PBL session, a Psycho-social tutorial and an Academic Literacy lecture.⁸

⁸ Lecturers in the Intervention Programme were not necessarily familiar with Feuerstein's theory of mediation, and therefore their interventions were not a deliberate application of the theoretical concepts.

6.2.2. Results from observing a PBL session

As was stated in Chapter Two, PBL is central to the core medical curriculum as it is regarded as a learning tool to develop problem-solving and critical reasoning skills that medical students will need when diagnosing and treating patients. For this reason a PBL session was selected for observation in order to collect and analyse data. In this observation students were presented with a paper case where a person has turned to religion to deal with the death of her husband. In the session they were discussing the difference between religion and spirituality, as this would eventually become one of their required learning objectives. During the observation, they were at the stage of accessing their prior knowledge, which is mainly grounded in similar work they covered in semester one, as the purpose of Intervention Programme Part One is to revisit key concepts covered in semester one. The observed case is described below.

Intervention Programme Part I: 2006
Case Four – Middle and Late Adulthood

It is forty years later....

Martin (59) and his wife Zara (58) are living in a comfortable home in Cape Town. They have two children, both of whom are studying at UCT. Martin is a director at a successful engineering company, while Zara has been involved in volunteer work at an Aids Orphanage. Martin's father, Siyanda, recently passed away after a long illness. Martin has asked his mother, Bongiwe (76) to move in with the family. Bongiwe is still trying to come to terms with Siyanda's death, and often expresses her anger at God for taking him away from her. Martin is surprised by her reaction, as she has become very spiritual in her later years.

Recently there was a terrible accident at Martin's company, and as a result, one of the machine operators was paralyzed. Martin realizes that the company needs to pay more attention to Occupational Health and Safety regulation. In a board meeting one of the younger directors hinted that it was time for Martin to resign, because he has lost touch with his workers. Martin felt very unhappy about the comment, as he is not ready for retirement.

This paper case was used as a stimulus for the following discussion on spirituality. The purpose of this discussion was to highlight the differences between religion and spirituality that students would have to master.

Extract from the PBL discussion

- 1) **Student 1:** What is spirituality? What is the difference between it and religion? Can a religious person be spiritual?
 - 2) **Student 2:** Yes, but not the other way round. A spiritual person is not religious.
 - 3) **Student 3:** What are you saying?
 - 4) **Student 2:** You can go through the motions, but not really believe in anything. Do it because you have to do it. That kind of thing, you know.
 - 5) **Student 1:** I don't agree. I know someone who has stopped going to church but they still pray every night. This person is not religious anymore. What is this person, she is not an atheist? She believes.
 - 6) **Student 2:** Yes, but also you can believe in a high power and not call it God. But you don't have to go to church. That is religion – the church thing. Spirituality is how you feel about the higher power, not God.
 - 7) **Student 4:** I am getting confused. What if you don't believe in anything, but in your heart you are a good person and you have good values. My uncle is like that. But he does not believe in anything. I cannot see the difference between the two things, and I am worried about the test. I made the same mistake last semester.
 - 8) **Facilitator:** Chairperson, before we move on, what are we trying to achieve with this discussion?
 - 9) **Student 2:** OK, so let's define it before we move on. They are both key issues for this case. Maybe we should write them on the board and see if we link them later.
- Scribe writes the two words on the board. Nobody responds for a while.**
- 10) **Facilitator:** Can we start linking and applying these concepts before we understand them?
 - 11) **Student 4:** No. I am still confused. What is this spirituality? Must we know a definition for it?
 - 12) **Facilitator:** Will a definition help you?
 - 13) **Student 6:** We did a definition last semester. Can anybody remember it?
 - 14) **Facilitator:** Can anybody tell me in their own words what they understand spirituality is?
 - 15) **Student 4:** Transcending to a higher stage. It gives you hope and creativity and something else.... You acknowledge a higher power. Something like that.
 - 16) **Facilitator:** OK, so let's start with an example that we can all understand from our own lives. Give me an example of spirituality from your own life.
 - 17) **Student 6:** I know people who believe in nature, like crystals. Healing powers of stones. They want to experience nature like a God.
 - 18) **Facilitator:** How do they believe? What do they do?
 - 19) **Student 6:** They believe that it is a force and that they have to respect it.
 - 20) **Facilitator:** Why do they pray or worship nature or the crystals?
 - 21) **Student 2:** To them it is more a force. Something they cannot explain why it is as it is, but that they need to respect it, and it has certain powers.

They like to spend time holding their crystals. Or wearing them around their necks. It makes them feel like they belong to the universe.

22) **Facilitator:** So why are these people spiritual?

23) **Student 2:** Yes...because they don't really follow rules, they just believe in a higher power.

24) **Facilitator:** Are you saying then that religion is when you believe in something, and you obey rules?

25) **Student 2:** Yes

26) **Facilitator:** Give me an example?

27) **Student 3:** Well, the Muslims don't eat pork and they go to mosque on Fridays. That is what they believe.

28) **Facilitator:** And do they believe in a god?

29) **Student 3:** Yes, and they follow his rules. Like fasting.

30) **Facilitator:** So how are these concepts, spirituality and religion, different?

31) **Student 1:** Well the one would be more about how and what you do to worship the power – like rituals that you follow, while the other one is more your own thing, your own rules. What you want to believe, it comes from you, not from something that is organised and telling you what to do.

32) **Facilitator:** You have now said that the difference between the two concepts is that for the one, religion, you need a structured set of rules, while for spirituality you don't necessarily need that, it comes from within yourself. In both spirituality and religion you have used the word "believe". Do you think these two concepts have anything in common?

33) **Student 2:** Yes, because both of them are not like a science. You cannot prove that there is a power or a force, you just believe it and it gives you a way of living your life. It gives meaning to your life.

34) **Facilitator:** So can you be both?

35) **Student 6:** Yes, if you have chosen a specific religion, and you make it your own, because you want to, but you don't really go to church. You do this because you want to, not because you have to.

36) **Student 3:** Yes, we must not think that religion is just empty, you know, like you are just going through the motions, but you don't care. Some people can be religious and spiritual.

37) **Facilitator:** So, coming back to your first question, how would you answer a question about religion and spirituality? Think of what *Ms Jacobs has taught you. How would you structure a question where you need to compare and contrast these two concepts? (*The lecturer who teaches Academic Literacy skills to the students. An analysis of one of her classes to follow)

38) **Student 4:** We can start with a definition of each.

The scribe writes "believe, organised rituals" underneath the word religion, and "believe in higher power, your own personal experience" underneath spirituality

39) **Facilitator:** Are you happy with these definitions?

40) **Student 6:** I think we understand them better, but we need to check in Berger as well.

41) **Student 2:** We can even do that table thing AL (academic literacy) has taught us. You know, we write the differences on the one side, and give

examples for both, and then we write the similarities for both and give examples.

42) **Student 3:** Yes, and those other things also. What are they again, connectors. We can use them and link the concepts.

Scribe starts to draw a table on the board and links concepts with arrows.

43) **Facilitator:** Why would you want to link your sentences?

44) **Student 1:** If we use words like “both these have to do with a believe system, however, religion has to do with rituals, while spirituality has to do with a personal experience of a higher power” then it makes more sense. You know, that thing about coherence.

In this case the data were analysed specifically to form a link with cognitive difficulties identified from the error analysis. Typically in a PBL session the students identify, clarify and brainstorm key concepts before they choose learning objectives which they need to research further for a follow-up session where they report back to the group. A chairperson guides the discussion, while a scribe keeps track of major points on a white board. In this case the facilitator allowed the discussion to continue for a while, presumably assessing the level of knowledge and comprehension before asking students to clarify misconceptions in order to apply concepts.

In Chapter Two mediation is described as a deliberate intervention by a well-informed and experienced person to guide students towards a better understanding. This dissertation draws on three categories of mediation: intentionality and reciprocity, meaning and transcendence. Intentionality and reciprocity refer to the mediator focusing the learner’s attention on the issue under study and then developing and shaping the activity to meet the learners’ needs. Mediating meaning requires making explicit, impact meaning, so that the mediatee understands the significance of the process (Feuerstein et al, 1991). Transcendence refers to the process where the mediator goes beyond the specific and primary goals of the learning interaction to provide the student with opportunities to increase his/her cognitive range (Feuerstein, 1991)

The facilitator joined the discussion in segment 8 by asking the group to reflect on the purpose of the discussion. In doing that the facilitator was mediating the concept of *intentionality*. Feuerstein et al (1991) refer to these concepts as

alerting students to the fact that there is a purpose to the learning activity. Students were made aware that they needed clarity by defining the concepts before they could start applying their knowledge. Students *reciprocated* in segment 9 by making an attempt to define the concept of spirituality, but they still needed further mediation as they were unable to move to the next phase. They were still inadequately experiencing the actual problem and subsequent defining of it.

In segments 10 and 12 the facilitator was mediating *intentionality* by once again asking them about the purpose of a definition. This question also demonstrated mediation of *meaning*, as students were made aware of the fact that they needed to understand the concept, not simply define it, if they wanted to apply it to other work. This also has elements of *transcendence*, as the facilitator was making them aware that they can use this concept in various aspects of their work. Student 4 in segment 11 responded by wanting a “quick fix” to the problem; he just wanted to reproduce a definition used in the previous semester. This once again demonstrated a lack of orientation towards logical evidence. It also demonstrates difficulty with proper planning behaviour in setting goals and finding logical steps in achieving goals.

In segments 14 and 16 the facilitator asked students to apply the concepts to their own lives as opposed to a textbook understanding. The facilitator was applying *mediation of meaning* to get students to understand the concept from their own experiences, as they obviously had difficulty in constructing a proper definition. By asking this question the facilitator was probing for a deeper comprehension of knowledge as opposed to rote learning. Feuerstein refers to this process as giving meaning within cultural boundaries, which gives students sense and purpose (Feuerstein et al, 1991). If students fail to grasp the purpose and meaning of symbolic tools, such as definitions that they need to “memorise”, the instrumental function is lost and students become bewildered by symbols with no meaning or relevance to furthering their learning (Tzuriel and Kaufman, 1999; Ben-Hur, 1998). The facilitator was then asking “how” and “why” questions to get students

to analyse the concepts of spirituality and religion by asking them to hypothesize and compare parts of the concepts before they could draw a conclusion in segments 18, 20 and 22. This approach could lead to a better ability to infer and deduce from a hypothesis.

In segment 24 the facilitator was using mediation of *intentionality* to draw students' attention to the need for summative behaviour. The facilitator was demonstrating to students that they needed to find relationships amongst various pieces of information in order to become more familiar with the concept. This was followed up in segments 26 and 28 through the mediation of *transcendence* by asking students to apply the concept to various examples. Students were made aware of the fact that they needed to follow a systematic approach using, principles and reflective reasoning to get to a better understanding as opposed to trial and error responses. If they did that, they could apply the concept and the principle of arguing to other areas as well.

In segment 30 the lecturer was again using *intentionality* to draw students' attention to the fact that they needed to select relevant, as opposed to irrelevant, cues in defining a problem and that they needed systematic and planned exploratory behaviour to consider two sources of information logically. Note how the facilitator deliberately scaffolded the questions to lead the student to this conclusion. Ben-Hur (1998) states that a mediator is someone who teaches students to compare the same criteria, using different categories to label experiences and to group them.

In segment 31 the student *reciprocated* with a far more logical and coherent answer as opposed to the beginning of the session. The facilitator mediated *intentionality* by summarising the discussion up to this point and by identifying key concepts they need to clarify in segment 32. The discussion moved to a higher cognitive level when the facilitator asked them to synthesise the two concepts and to find similarities between religion and spirituality. Note how students' responses became more coherent and focussed, as they had been taken through a logical and

planned process of collecting data in order to use it for the rest of the session. They demonstrated more precision and accuracy in communicating their responses, as opposed to sweeping statements in the beginning of the session.

By asking a question about written application of their knowledge, the facilitator was mediating *transcendence* in segment 37. Transcendence enables the student to make connections between the general and the specific. As a result of transcendence, the student develops the ability to apply the learnt skill elsewhere in slightly different ways (Feuerstein et al, 1991). The facilitator was also mediating *intentionality* to draw their attention to the fact that they need to know how to structure logical and coherent answers. Students responded in segments 38, 40, 41 and 42 by suggesting a systematic approach to a written answer by using rules and principles taught to them. In doing this, they demonstrated reflective reasoning as opposed to trial and error responses. Finally the facilitator used *intentionality* to draw their attention to the purpose of using written tools to demonstrate precision and accuracy in communicating adequately elaborated responses.

6.2.3. Results from observing a Psycho-social tutorial

Together with lectures, practicals and PBL sessions, tutorials form the basis of the mediated learning environment of the programme. It is important to note that students in the observed tutorial were already familiar with the content of this unit, so the main focus of the tutorial was to identify gaps in their knowledge and to strengthen the skill of critical reasoning.

The ten participants were observed and video recorded for six hours during three tutorial sessions. During the two hour Psycho-social tutorial students were revisiting the concept of “middle age” in the Life Cycle. The unit started with a problem-based case where students had to identify learning objectives. One of the learning objectives was to describe the typical developmental tasks of middle age. A lecture followed where students were introduced to the key concepts of middle age, and guided towards selected and relevant reading material from the text book

(Berger, 2005). Students were given the tutorial a week before to prepare their answers. Concurrently the Academic Literacy lecturer focussed on academic reading and writing skills necessary for answering questions related to the tutorial.

Results from this part of the thesis indicated how the lecturer guided the students through applying the concept of mediation. Transcendence, meaning and intentionality were mediated via a series of higher order questions and engaging students in constructive arguments. Below is the paper case used in the tutorial.

MIDDLE AND OLD AGE

Tutorial 7 -2006

In the following cases a patient has come to you for advice/treatment. Drawing on your Psycho-social knowledge, identify the key "contextual" issues having an impact on your patient's well being.

John Boleka is 50 years old. He is a highly successful lawyer who is not ready to face retirement. He has come to you, as he is concerned about his weight gain. In talking to you he admits he has fallen in love with his secretary (28 years old) and wants to leave his wife and three teenage children. He is however concerned that his community might think less of him. He is also very tired during the day because he cannot keep up with his secretary's energetic lifestyle...

In what follows, the lecturer uses questions as cognitive tools to mediate meaning, intentionality and reciprocity and transcendence. This extract, therefore, indicates the crucial developmental importance that questions potentially serve.

Extract from a Psycho-social tutorial

1. **Lecturer:** Could you treat or advise this patient without having any Psycho-social knowledge? Let's say we prescribe a diet, have we solved his problems?
2. **Student:** No. Not at all.
3. **Lecturer:** What is going on here? What are the key issues?
4. **Student:** He is married, but he has problems. He is having an affair. He is overweight. He has a family. He has a good job. I think he is worried what people are saying about him.
5. **Lecturer:** Is this normal? How do we know that what is happening to him is normal for middle age?
6. **Student:** The tasks of middle age. That thing about the individual tasks, the tasks with partners and children, and the tasks with the community. Also with leisure time what he would like to do now in his life. We can look at all of that.
7. *Students proceed to write the typical tasks of middle age on the white board.*

8. **Student:** From Berger (the text book) he should become the watchdog of the society and he should stick with his wife. He must think about retirement.
9. **Lecturer:** Why?
10. **Student:** It is one of the tasks of middle age to make peace with growing old with your spouse. He should also be thinking about money – retirement, he cannot just leave it all behind now and start over with a new girlfriend.
11. **Lecturer:** Why can't he just be thinking of his own happiness?
12. **Student:** But it is his responsibility to support his children. Their role model. He needs to be the breadwinner and provide support.
13. **Lecturer:** What will happen if he is not there?
14. **Student:** He should be there for his children, but he is not committed. Kids are still developing. If he leaves his wife, what will his kids go through? A girl needs to look at her father to understand the role of men.
15. **Lecturer:** What do you mean? Explain some more?
16. **Student:** What if his daughter gets confused about men. What if she thinks all men have affairs?
17. **Lecturer:** Do we have a theory to prove that? Is this true that daughters see their fathers as role models for relationships?
18. **Student:** Yes, I think. Look at the gender theories we did last time. Social-cultural theory. Even Freud, that strange one about daughters wanting to marry their father. How can you want to look up to your father when he is having an affair?
19. **Student:** Also look at that theory about moral development.
20. **Lecturer:** Kohlberg?
21. **Student:** Yes. This man is not using high morals. He is just worried about punishment. If the community finds out.
22. **Student:** And the identity formation theories. He is facing a crisis, but he is not committed to the change. Maybe he is still immature.
23. **Lecturer:** So, when we look at all these theories, are you all saying he needs to be committed to his family, be a role model and get ready for retirement?
24. **Student:** Yes
25. **Lecturer:** Why?
26. **Student:** To go through the normal stages of middle age.
27. **Lecturer:** What do you think is the purpose of these stages? Why must he go through them?
28. **Student:** To get ready for his old age. So he can move to the next stage. You know, his well being for when he grows old.
29. **Lecturer:** Do we have any guarantees in psycho-social that things will always work out that way for everybody?
30. **Student:** No, but we can speculate. If the case says that he is having an affair, we can see that his life is going in a different direction. So we can speculate what is going on in his head.
31. **Lecturer:** What do we do if we want to speculate in our writing?
32. **Student:** We can say "could" and "maybe". It **could** be that he is confused. Or immature. And then write all that stuff from Marcia. And

then say that he **appears to be** immature if we compare and contrast it with the theories.

33. **Lecturer:** OK, coming back to John. You said he is immature. He has a job and a family, but you said he has a problem because of the choices he is making.

34. **Student:** Well, look at the stuff in Berger. That stuff on the board. He is not fulfilling his developmental tasks. Not one of them. Look, he is only after his own needs, not asking what society wants from him. Or his family.

35. **Lecturer:** So, as a doctor, would you be worried about his well-being?

36. **Student:** Yes. On top of that he is too fat.

37. **Lecturer:** Any suggestions how we should deal with him? When you are a doctor one day.

38. **Student:** If he was my patient I would think that physically he needs to go on a diet, but he has his own life. I will tell him about vitamins and exercise. I might not like what he is doing, the affair is making me angry, but I cannot call him immature. It is his life, his choice. Maybe he is searching for meaning in his life. I just need to keep my eye on him. You know, like make a note to me about what is really happening in his head. Ask him to go and see a shrink.

This tutorial was analysed to get a better understanding of how questions were used to mediate learning activities in the Intervention Programme.

The lecturer started the tutorial by alerting students to the value and relevance of the learning activity in segments 1 and 2. Even though these students were in an Intervention Programme currently busy with a Psycho-social learning activity, they were reminded that the end goal of their studies is to become health practitioners treating patients. The lecturer was therefore using the concepts of *meaning* where the implicit reason for learning becomes explicit (Feuerstein et al, 1991). Students were reminded of the bio-psycho-social framework preferred by the Faculty for diagnosing and treating patients, as defined by the World Health Organisation. The purpose of the lecturer's question, as stated by Ben Hur (1998), was for these students to continue having a feeling of sense and competence, so that learning becomes a meaningful situation.

In segments 3 and 4, the lecturer was applying the concept of *intentionality and reciprocity*. By asking the question about key concepts, the students were alerted to the learning activity (intentionality) and asked to respond (reciprocity). As

Klein (1991) states, this was a deliberate attempt from the lecturer to achieve a change in the students' perception. Students were made aware that the material presented to them contained relevant information that they needed to sift, sort and prioritise in order to have a full understanding of the patient's presented problem.

In segment 5 the lecturer asked students to use the key concepts identified to evaluate whether the patient in the case is exhibiting "normal" behaviour. Students needed to apply critical reasoning in order to answer the question, as they had to use sound criteria and standards for analysing and assessing their own thinking. By using the words "how do we know" the lecturer mediated to them that they could not merely give an opinion. They realised once again that material presented to them was not coincidental. Students responded (reciprocity) by grouping and ordering material they had learnt in order to proceed with evaluating whether this is "normal" behaviour.

In segments 8 to 25 the lecturer was engaging students in arguing constructively about the patient's behaviour. The lecturer was constantly asking students to compare two sources of information simultaneously – the behaviour of the patient and relevant psycho-social theories. Students were therefore mediated via *transcendence* to apply their textbook knowledge to a new case in order to move from simply knowing to understanding. Note how the lecturer was constantly asking students to reflect on the patient's behaviour without stereotyping his behaviour or making judgemental statements. By constantly asking "why/how" questions, students were encouraged to use academic sources to justify their responses. Note how students were using critical reasoning to revisit the stages of middle age and to apply it to the patient.

In the next phase where the lecturer asked 'the purpose of these stages' she was using *meaning* to get students to reflect on why they had to learn the stages of middle age. Students were therefore encouraged to become critical thinkers who examine and understand the purpose of a learning activity.

Students' attention was then drawn to the fact that the discipline of the Psycho-social module is not exact and definite (segments 29 to 33). Through *transcendence* they were reminded that they needed to indicate in their arguments and writing that there could always be more than one conclusion. The lecturer went deeper than the concrete context of the material, and taught a general rule of the discipline. She showed students how they could apply writing skills taught to them by the Academic literacy lecturer to the context of this tutorial, and other similar tasks.

In the final phase of the tutorial, segments 35 to 38, the lecturer reminded students again of their responsibility and role as health practitioners. They were made aware of how this material would present itself in real life – the *meaning* of this activity to them. It confronted them with objective and subjective values about patients.

6.2.4. Results from observing an Academic Literacy lecture

During this observation the staff member handed back a reading and writing assessment and gave an overview of the techniques students had to use in order to be successful in the assessment (Appendix VI). The content of the assessment is embedded in the Psycho-social component of the course and dealt with the concept of stress. This case was analysed to gain a better understanding of mediation used to facilitate the use of symbolic (reading and writing) tools. Again, we see the use of questions as tools that mediate intentionality, transcendence and meaning.

Extract from Academic Literature lecture

1. **Lecturer:** How can you avoid leaving out easy questions? If you leave out questions, you lose marks. How can you avoid that?
2. **Student:** Manage time better
3. **Lecturer:** What does that mean in practice?
4. **Student:** Calculate the marks and time? Glance at the paper.
5. **Lecturer:** What about deciding which question is the easiest?
6. **Student:** How do we know which one is the easiest?
7. **Lecturer:** Could there be clues in the question itself?
8. **Student:** Are you talking about action words? What about key words?

9. **Lecturer:** Yes, let's talk about key words in the question. What is a key word in question one?
Students identify key word.
10. **Lecturer:** Now that you have identified the key words, what is important about this question to bear in mind?
11. **Student:** It is the author's viewpoint.
12. **Lecturer:** How do you know that?
13. **Student:** It uses the word "opinion".
14. **Lecturer:** Will all authors agree with this viewpoint?
15. **Students:** Not necessarily.
16. **Lecturer:** How can you indicate in you writing that it is the author's opinion, and perhaps not even yours?
17. **Students:** We can write "according to so and so"
18. **Lecturer:** If you read and realise that an author is using more than one term for the same word, what can you do?
19. **Student:** Make a note in the margin?
20. **Lecturer:** Why do writers do that?
21. **Student:** Maybe the first word is a term everybody knows, and the second word is a more difficult scientific term?
22. **Lecturer:** Are you saying they are guiding us by introducing the word first as a term that we can all relate to and later on they use a more scientific term?
23. **Student:** Yes, but I am confused. Why do writers not tell you that they are going to do it?
24. **Lecturer:** Good question! But sadly it is still for us as readers to pick up on these clues.
25. **Student:** But it is confusing. How can I make sure that I don't misunderstand it?
26. **Lecturer:** How would you read this piece before you write about it?
27. **Student:** I will start with an overview before I move to the inview that would help me. I could also make a mind map of all the key issues.

In segment 1 the lecturer was asking "how questions" to mediate meaning to them as she was conveying the importance and value of being successful. She was using *intentionality* to demonstrate to them that there were underlying strategies involved in this particular task. Students *reciprocated* by giving options to obtain this goal. The answer needed further clarification for a practical approach, so the lecturer asked students to apply a specific skill taught to them to a general situation – therefore applying mediation of *transcendence*. In segment 4 the student still responded with a vague answer, which could reflect a lack of goal orientation and unsystematic exploration of the problem.

When the lecturer guided students towards a practical approach, their response demonstrated the difficulties they experienced with selecting relevant cues in defining a problem. Through drawing their attention to the structure of questions, she was mediating *intentionality* in segment 7. Students *reciprocated* with a better understanding of recognizing details needed for distinction and description of the problem.

In segment 10 the lecturer was mediating *intentionality* to demonstrate to them that there is a specific aspect of the question of which they needed to take cogniscence. Students *reciprocated* by selecting the relevant cues and therefore becoming aware that they needed a planned and systematic exploratory behaviour to solve this problem.

In segments 14 and 16 she mediated *transcendence* by alerting them to the fact that they could apply a specific skill to a general situation about reading. Segment 18 demonstrates how the lecturer was deliberately giving students tools in order to work with the text, in other words a symbolic tool was mediated to them. Once again the lecturer was mediating via *transcendence*.

By asking a “why” question in segment 20, she mediated the *meaning* of a certain written tool to students. She demonstrated that the written text contained clues that they needed to be aware of in order to work with it. The student in segment 25 demonstrated difficulty with discriminating from a written text in order to perceive commonality or difference. The lecturer responded with a “how” question to draw students’ attention to reading tools they had acquired to help them solve this problem in segment 26. In other words she was using *intentionality* to draw their attention to the purpose of reading tools, as well as *transcendence*, to make them aware of the general application of a specific tool mediated to them. In segment 27 the student responded with suggestions for a systematic approach using rules, principles and reflective reasoning.

At this point the lecturer asked the class to do a mind map and then followed by drawing a mind map on the board to show students how to avoid this particular type of confusion by making sure all the key words were addressed in the mind map. Students responded by correcting their mistakes from the test.

6.2.5. Pattern classification

The next step involved identifying and classifying patterns in the data across all three learning activities. Results indicated that all three lecturers used similar approaches with regards to mediation. In all three learning activities lecturers were asking “why” and “how” questions.

Intentionality and reciprocation

The lecturers were constantly alerting students to key issues by focusing their attention on the intentionality of the learning activity. Evidence of this can be found in the PBL session where the facilitator intervened by asking students what they wanted to achieve with the discussion (segment 8). At this stage of the discussion students were getting confused and presented anecdotes as evidence. The facilitator drew their attention to the importance of identifying and defining key concepts before applying knowledge. Another example of intentionality can be found in segment 30 where the facilitator’s question deliberately drew students’ attention to the fact that they needed to compare and contrast the concepts of religion and spirituality. Students reciprocated by composing a logical and coherent answer as opposed to anecdotal evidence given earlier in the discussion to justify responses. Evidence of intentionality could also be found in the Psycho-social tutorial. In segment 5 the lecturer used a question to focus students’ attention on the role of key concepts in applying knowledge. Students reciprocate by grouping and ordering learnt material to proceed with the rest of the learning activity. This example showed how intentionality addressed blurred and sweeping perception as students understood the purpose of the learning activity much better after the lecturer guided them. Evidence of intentionality from the Academic Literacy lecture could be found in segment 1 where the lecturer’s question demonstrated to students that there were underlying strategies involved in the learning activity. In this case students reciprocated by looking for

constructive ways to identify the strategies, as opposed to a trial and error response. This is another example of mediation addressing cognitive functions.

Meaning

All three learning activities also contained mediation of meaning. In the PBL session the facilitator asked students to reflect on their own lives to understand the relevance of religion and spirituality (segments 14 to 16). She therefore used questions to promote a deeper understanding of the concepts, as opposed to rote learning. In the Psycho-social tutorial the lecturer asked students to reflect on the relevance of the learning activity in relation to their future roles as doctors (segments 35 to 38). Mediation of meaning was therefore used to demonstrate to students that material from the learning activity would present itself in real life. Evidence of meaning could also be found in the Academic Literacy lecture. In segment 1 the lecturer used a question to mediate the meaning of successful performance in an assessment activity. In this extract she also continuously used mediation of meaning to demonstrate the relevance of acquiring reading and writing skills.

Transcendence

Transcendence was also used in all three observed activities. In the PBL session the lecturer used transcendence to guide students towards specific and general skills. In segment 37 she used a question to demonstrate to students that they could transfer their academic literacy skills to the task at hand when structuring logical and coherent answers. Students were therefore made aware that they had acquired specific academic skills, which they could apply to general situations. Evidence of transcendence in the Psycho-social tutorial could be found in segments 29 to 33 where mediation was used to demonstrate to students how a specific example of arriving at multiple conclusions could be applied as a general principle in Psychology. In the Academic Literature lecture questions were also used to mediate transcendence. In segment 18 the lecturer gave students tools to work with text and to apply this skill to general situations.

6.2.6. Linking to theory

The results from the three learning activities were compared with Feuerstein's theory on mediation. This formed the final part of the deductive part of the thesis in order to build a logical chain between data and theory. The data generated from the observations were juxtaposed with theory related to mediation, and resulted in the following findings:

- evidence of behaviour fostering reciprocity in students
- evidence of behaviour fostering transcendence
- evidence of behaviour associated with meaning.

Using Ben Hur's (1998) guidelines regarding mediated learning experiences, all three cases contained the necessary elements.

Behaviour to foster *reciprocity* in students included:

- Asking “why” and “how” questions rather than “what” questions.
- Responding to students in a non-judgmental manner
- Encouraging students to offer alternative ideas, but to justify their answers with academic evidence
- Listening to students
- Focusing students' attention on the fact that the material presented to them included key issues, as opposed to random information.

Behaviour that models *transcendence* included:

- Making a clear connection between this current learning experience and previous learning experience (academic literacy, previous lectures, using the text book)
- Asking “why” and “how” questions
- Relating this learning experience with transcendent goals – students become aware that they now possess skills that can benefit them in similar situations.

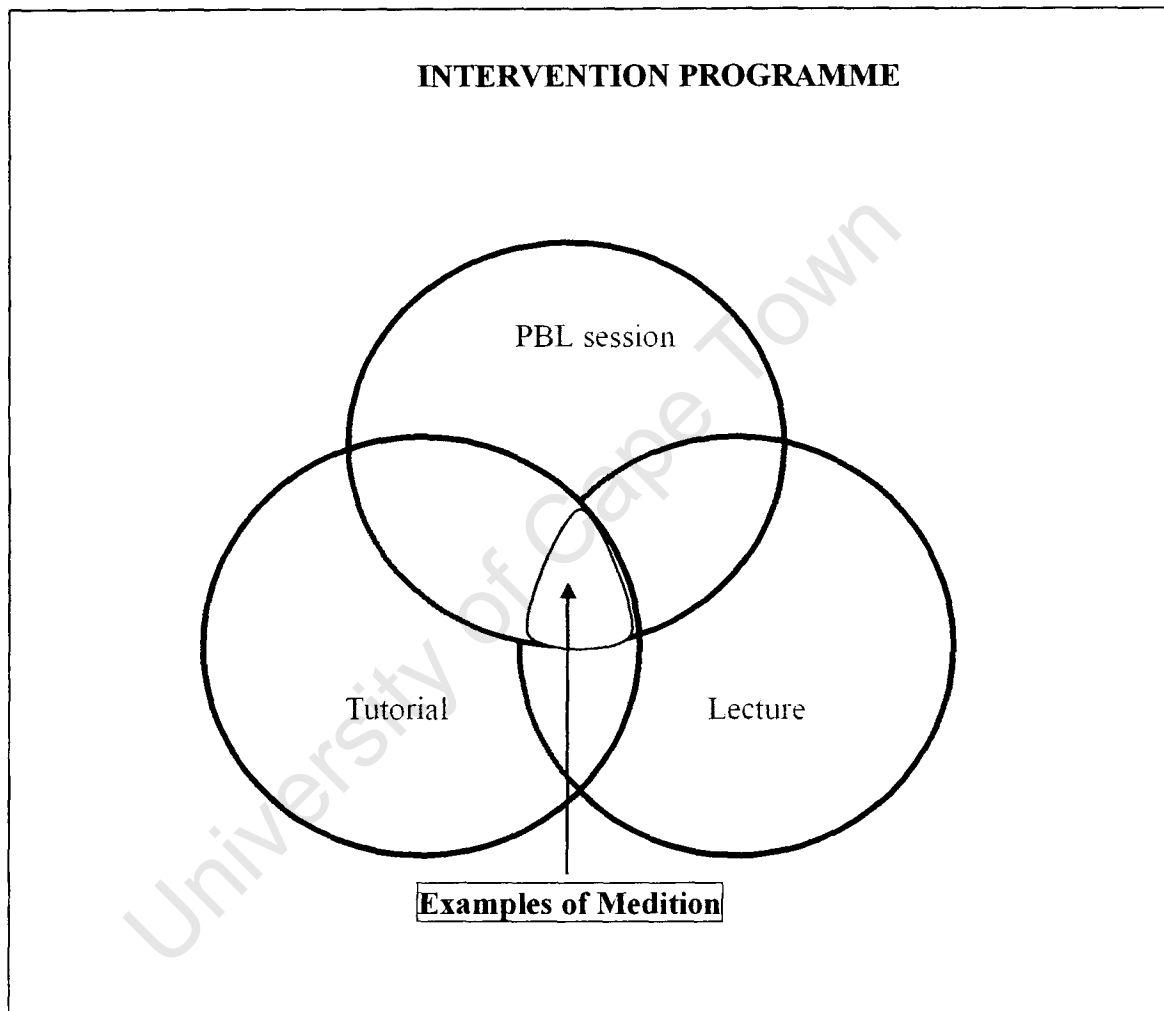
Behaviour associated with mediation of *meaning* included:

- Encouraging students to transfer their current learning across the curriculum and into their future careers
- Giving explicit values to this learning experience
- Asking “why” and “how” questions

- Making the learning goals of this situation clear to students.

Based on the results of the observations, Figure 5.2 is a diagrammatic representation of mediation in the Intervention Programme

Figure 6.1: Diagrammatic representation of mediation



From Figure 6.1 it is evident that mediation occurred across all three learning contexts in a consistent way. In other words, the same mediation techniques were used even though the contexts, aims and teaching methodologies of the three learning situations were different. We may conclude thus; as mediational techniques were used in the Intervention Programme in consistent ways across different scenarios and “teaching spaces”, mediation potentially served to develop students cognitively, accounting for enhanced performance on the tests discussed in Chapter 5.

6.3. RESULTS FROM THE INTERVIEWS WITH STUDENTS

Interviews were conducted with the ten participants to gain insight into how they experienced the Intervention Programme. Open-ended questions were asked and no time limit was set. Comments were sifted and sorted to fall into one of three categories.

- 1) Students' perception of what went wrong in semester one (mainstream) that lead to them failing.
- 2) Students' perception of the Intervention Programme
- 3) Students' experience of mediation in the Intervention Programme

The comments were selected based on the fact that they represent the general opinion of the ten participants.

6.3.1. Students' perceptions of performances in mainstream

In the absence of mediation an underprepared student could become "a rigid system who benefits little from the exposure to stimuli." (Feuerstein et al, 1991, pg 13). They argue that such a student will not become efficient on his/her own, and will not have the readiness to learn, even though the student might be surrounded with ample stimuli. Evidence of this can be found in the following comment from a participant.

Extract 1:

PP: I think it was mostly the Psycho-social because I never got to remember whose theory is for who and the name and the theory could never like link in my head. I understood it a bit, I did not grasp it properly enough to write, like I would study and think I have it, but then I did not understand it and I think I should have asked for help or something.

This comment demonstrates that although the participant was aware of the role and relevance of theories in the Psycho-social module, she could not engage with the material to apply her knowledge. It seems that she experienced blurred and sweeping perception when encountering theories, and that she compensated by rote learning. According to Vygotsky (1978) one could surmise that the role and purpose of evidence (theories) was not mediated enough in order for her to recognise it as a symbolic tool. Extract 2 illustrates a further example of blurred and sweeping perception.

Extract 2:

SN: I think I did pay attention.. but I think it is something to do with understanding and trying to get the knowledge and apply it. Something was missing in between the knowledge and my understanding. Even when I was studying some of the things I could not understand them clearly. I would just start anywhere, and then get so confused. So I just wrote anything in the tests and hoped that it would be the right thing. Not really listening and understanding in class, just hoping for the best.

This comment also demonstrates that the student experienced blurred and sweeping perception. She realised that she had to engage with the knowledge, but was unable to explore the material in a systematic and planned manner. Another cognitive difficulty experienced by this student was her approach of trial and error. Once again, one could surmise that the participant experienced difficulty because learning activities were not sufficiently mediated to her in order for her to realise the intentionality and meaning of the work.

6.3.2. Students' perception of the Intervention Programme

In this portion of the study, I was interested in developing an understanding of students' perceptions of the programme. Results reported in Chapter 5 and above show that mediation certainly happens in the programme and that, if we theorise this as the foundational principle in learning, this accounts for students' enhanced engagement with academia. Extract 3 indicates that mediation has helped him to see various aspects of a problem and helped him to "really think about it".

Extract 3:

NN: It is just now I have got the technique of how you look at things cause last semester we would just think ok they show us this, so they will ask us this, but they never asked the questions the same as the things they showed in the lectures. But now, you have to look at all the different angles of a thing and be able to recognize it. Now I really think about it. Like that exercise we did when we had to write the PBL case ourselves. Now I know why people put things there for us.

This extract demonstrates that the participant realised that understanding is needed in order to apply knowledge. The participant also understood that the intention of a learning activity is not necessarily to facilitate rote learning, but to stimulate critical thinking skills so that students can apply their knowledge to different situations. From the extract it is evident that participants reciprocated by engaging on a more conscious level with the learning material. Moreover, there is evidence

that the IP serves as what Tharp and Gallimore (1988) would term a ‘cognitive structuring’ tool. That is, a tool that serves to break up complex ideas into manageable ones and literally structures students engagement with the complexity they face when engaging with unfamiliar concepts. This is illustrated below.

Extract 4:

RN: I think just the way in which she (Intervention Programme lecturer) brings the work across. It is very easy to understand. The way like when I go back to my room and I study the work, it is still not easy, but you know what you have to do. You don't have to go and worry how they will ask it in the test.

This extract demonstrates that the participant found the learning activities in the Intervention Programme constructive and useful, as she had grasped the meaning and intentionality of the work. By stating that the work is simple and easy to understand, one could surmise that the lecturer made use of scaffolding activities to explain the learning material.

6.3.3. Students' experiences of mediation in the Intervention Programme

The interviews also probed for students' experiences of mediation in the programme. Below students recount these experiences.

Extract 5

SS: You know that theory on “bonding”? When she got us to write the essay and to apply it to my own life, it started to make sense. And that helps me to remember and even when I got to study I can remember... OK...it helps me remember my work. I think it is interesting because you can apply. So the more you apply, the more you know, the more you understand it and the more you won't forget it.

This comment demonstrates that meaning was mediated to the participant during a learning activity. The student understood the relevance of this theory as she could understand the value of the concept in her own life. As a result she was able to apply this concept to general situations. She had also become more motivated to engage with the learning material as she could see the relevance of it. The programme's focus on developing Academic Literacy skills was also mentioned by students as a useful mediating technique.

Extract 6:

NS: Especially I find two things that are linked, the Psycho-social and Academic Literacy because that is what I find when I was answering the paper before. I would write something and find myself very confused because I did not know what I was writing. I knew what I wanted to say, it was just... I did not know how to put it down. And with Academic Literacy it helps a lot how to structure everything and even with my essays now I think it has also improved them. She helped us how to study and how to write like a good practitioner.

This comment illustrates that transcendence was used by the lecturer in order to demonstrate the use of a specific skill in a general context. The participant understood the role of language as a symbolic tool within the context of Academic Literacy, and could now apply the skill in different situations.

Extract 7:

RN: Just the way that the lecturer has structured the notes are helping a lot more now. It will have a heading and then this and this under it. It is not wishy washy, it gets to the point, and have the information that you have to know and you can just use your energy on them and then move on. I know what I have to do now when I go back to my room. Also like the exercise on writing a good paragraph. The first time we just did a mind map, the second time she asked us questions about it. And then we went over it in class, and I was like, oh, for the first time I realised how to read. Before I did not read properly, and that cost me marks. I really like it, because it was just, like when you are in a test situation, what do you look for. Key words, it is so simple and it really works.

This comment shows that intentionality was mediated to the students by structuring learning material in such a way that the purpose of the learning activity became clear to them. The participant reciprocated by making use of the material when she studies. The participant also comments on a scaffolded learning activity to enable students to interrogate text. In this activity the lecturer used intentionality to gradually show students how to identify key words. The student reciprocated by engaging in the learning activity and came to the realization that she had gained the skill to recognize text as a symbolic tool.

6.4. CONCLUSION

This chapter discussed the role of mediation in a Psycho-social module in the Intervention Programme. Results demonstrated that mediation was present in all three observed teaching and learning activities. That is, given that mediation is theorised in this thesis as a foundation for successful learning, the presence of mediation suggests that it is the process of this teaching strategy that has impacted

CHAPTER SEVEN

DISCUSSION

7.1. INTRODUCTION

Before embarking on this study, I became aware of academic difficulties experienced by some of the first year students in the MBChB curriculum. I also witnessed vast improvements of the same students once they entered an academic development programme. The shift from their initial underachievement to performing at their level of potential became the focus point of the thesis. Using interviews, observations and an error analysis, data were collected and analysed to explore cognitive and academic difficulties experienced by students, and to describe the role of mediation in assisting students to construct sound academic knowledge and perform at their optimum level of potential. Patterns emerging from all three sets of data have elucidated a better understanding of the key factors that underscored the basis of the question posed at the beginning of the study. Further, data elaborated in Chapter Five indicated the Intervention Programme impacted on students' performance on the PTEEP, SRT and Psycho-social tests.

7.2. REVISITING THE RESEARCH QUESTION

The overall question that directed the collection and analysis of the data was:

How does an Intervention Programme mediate knowledge to educationally disadvantaged medical students?

In order to answer this question, sub-questions were formulated to allow for thorough exploration of the study's demarcated areas. These questions were:

- In what ways do educationally disadvantaged students demonstrate "at risk" behaviour?
- How does the Intervention Programme scaffold learning activities?
- How do students view the role of the Intervention Programme in strengthening their academic performance?
- Does mediation in the Intervention Programme lead to a shift in test performances?

The next part of the discussion will address insights gained from the sub-questions and conclude with key findings from the study to answer the overall question.

7.2.1. The notion of “at risk”

In order to gain insight into the reasons for underachievement of educationally disadvantaged students, this study explored academic and cognitive difficulties demonstrated by the ten selected participants in this study. Drawing on the literature reviewed in preparation for this study (Du Plessis et al, 2005; Eiselen & Geyser, 2003; Kies & Freund, 2005; Mathews et al, 2000; Murphy & Maree, 2006; Parkinson et al, 2007) it was surmised that, although not conclusively proven to be a reliable predictor of success, scores from pre-tests could be an indication of cognitive difficulties that students will experience at a tertiary institution. Matriculation results and pre-selection tests scores indicated that the majority of the ten students selected for this study could be construed as potentially “at risk”. Nine of the ten students came from educationally disadvantaged backgrounds, which, due to the enduring apartheid legacy, was a further indication that these students could face an uphill struggle when confronted with the complexities of higher education (Boughey, 2007; Burch et al, 2006; Macdonald, 2006; McMillan, 2005; Mehl, 1991; Yeld & Haeck, 1997).

The only student who did not fit the profile of potentially “at risk” is identified as student 4 in Table 5.1. on page 102. This student had a high matriculation score and only indicated a slight probability of academic difficulty in her overall Placement Test in English for Educational Purposes (PTEEP) score, when compared to the general population score. This student is from an Afrikaans background and one could therefore surmise that she encountered semantic difficulties, which could have contributed to certain misconceptions as was discussed in Mehl’s (1985) study. It could also be that she encountered non-academic factors that impacted on her performance. However, all ten students were unsuccessful in their June exam and therefore entered the Intervention Programme.

7.2.2 Insights from the error analysis

Against the background of “at risk factors” the ten participants’ first semester exam scripts were analysed, using steps suggested by Miles & Huberman (1994) to identify the underlying cognitive difficulties they experienced. Using an inductive process the results were narrowed down to fourteen “typical” mistakes made by all ten students in their Psycho-social scripts and linked with Feuerstein’s (Feuerstein et al, 1980) categories of cognitive difficulties. This process was done in connection with the findings from Mehl (1985), Tribus (2005) and Oon-Seng Tan (2005) regarding the key dimensions for an intervention programme; in order to maximise mediated learning experiences, the researcher should first gain insight into cognitive difficulties experienced by students.

On the surface it appeared that unsuccessful responses to the demands of the exam paper included an inability to approach the question correctly by recalling relevant knowledge, an inability to link information and apply knowledge and an inability to write a logical and coherent answer. The Psycho-social module in the first year MBChB course requires students to be familiar with a range of theories and to apply these to a paper case. Different to the Science disciplines, such as Chemistry, Physics and Human Anatomy that students also encounter during their first year, the Psycho-social module expects students to use modality when constructing arguments. In other words, a Psycho-social module deals with uncertainties and attitudes, rather than certainties and facts, and therefore students should avoid neat classifications when constructing arguments. Examples of modals are “would” and “might”. To many students this is the first time they have been required to express themselves in the particular genre required for Social Sciences. Following this argument, it is therefore no surprise that a deeper analysis of students’ errors demonstrated an inability to understand text genre, an inability to understand the specific disciplinary communicative function of sentences and an inability to use the correct vocabulary when constructing an argument. When students were asked to hypothesise whether a certain event could impact on a person’s behaviour, they presented their answers as facts, without providing the necessary evidence to back up arguments. Students would typically

not link and apply theoretical concepts that would elaborate their answers to justify their statements or they would struggle to understand the Social Sciences' notion of multiple conclusions and likelihood.

Another pattern, related to the mainstream Psycho-social module, was the inability to distinguish between disciplinary and "everyday" knowledge. Although the course was introduced to students as a Social Science, it appears that some students could not differentiate between theory and speculation. This was evident from superficial answers, sweeping statements and conjectures. A deeper analysis showed that students had difficulty using evidence to support their answers, or understanding the validity of a claim. They therefore often reverted to irrelevant and personal detail and did not get to the point. An example of this was found in error 12 where participants gave anecdotal evidence to answer questions. These findings correlated with Slonimsky and Shalem (2004) who identified similar patterns in the ways potentially "at risk" students approach their work; for example, a tendency to focus on examples rather than principles and a tendency to write from a subjective viewpoint, often using anecdotes unrelated to the text, and a tendency to be prescriptive rather than analytic.

The third pattern emerging from the error analysis, not specifically related to the Psycho-social module, was an inability to access and apply higher cognitive functions. This was evident from mistakes that included a misunderstanding or misinterpretation of questions, inability to recall and select relevant information from a body of knowledge and inability to process information so that a logical answer could be constructed. A deeper analysis showed that students found it difficult to separate the essential from the nonessential, to extrapolate, apply and infer, to find relationships in data and to synthesise the essence of the argument. As a result, answers were often completely incoherent, which could also be an indication that students did not possess the necessary semantic tools necessary for a coherent interpretation and execution of the answer.

These findings lead to the final part of the error analysis, which involved an analysis of the errors to make conceptual and theoretical coherence by comparing

the data with Feuerstein's categories of cognitive difficulties. Although Feuerstein's theories on cognitive difficulties provided valuable insights into the academic behaviour of the participants in this study, it is important to guard against using these categories as a "check list" to label and stigmatise educationally disadvantaged students. Every effort was made in the current study to avoid this pitfall; however, the next section continually refers to terminology used by Feuerstein to describe cognitive difficulties as I have found them to provide a comprehensive description and explanation of data analysed in the dissertation.

The most common error experienced by all of the students was an inability to apply their knowledge. Results from the current study linked this problem with Feuerstein's categories of trial and error and restricted inferential hypothetical thinking. This refers to an inability to deduce from a hypothesis and to follow a systematic approach using rules, principles and reflective reasoning. From literature reviewed for the dissertation (Du Plessis et al, 2005; Chaplin, 2007; Mathews et al, 2000; Singh, 2000; Smith & Edwards, 2007) one could surmise that these problems stemmed from a schooling system that still favoured a rote-learning approach. The majority of the subjects in this study attended schools that were still classified as educationally disadvantaged institutions and possibly still do not have the resources to promote deep processing, critical reasoning and problem-solving skills. Even though students were given the opportunity to apply their knowledge during assessments, the facts memorised by them were useless, as they had not adopted new skills to improve critical thinking in order to move from rote-learning to an understanding of how to solve problems. This resulted in poor performance.

Two other typical cognitive difficulties experienced by the majority of the students had to do with the data gathering process before solving a problem. Students demonstrated an impaired need for precision and accuracy when gathering data, resulting in blurred and sweeping perceptions. Once again this indicated that students had not developed critical thinking skills necessary for

success at tertiary level, as they were unable to exercise clarity when having to recognise details and cues. It is therefore not clear to them whether data is necessary and relevant for solving a problem. Their data gathering process showed elements of carelessness and an inability to be exact. To address these difficulties students will have to be shown how to gather data efficiently, as the rest of the cognitive processes, elaboration and output, hinge on this first step.

Other common cognitive difficulties experienced by most of the students in this study linked closely with the previous discussion regarding the Psycho-social module as a newly introduced discipline. Students struggled to consider two sources of information at once, which could indicate that they found it difficult to use cues from the paper case in order to apply a certain theory. It is therefore vital that problem-based learning techniques are mediated to them, as this process should enable them to sift through information in order to form links between different bodies of knowledge. The fact that they also had difficulty with orientating themselves towards logical evidence indicated that they had not grasped the role of theories in substantiating a Psycho-social answer. Impaired verbal tools for communicating adequately elaborated responses produced another typical difficulty experienced by most students. With one exception, all the other students were second language English speakers. Experiencing semantic difficulties, which hampered their optimal cognitive functioning, resonates with Paxton's (1995) findings regarding the difficulties second language English speaking students experience when confronted by the highly abstract language of disciplines taught at university level. It is therefore important to scaffold the process of acquiring academic literacy skills so that students can reach their potential and perform successfully at a tertiary level.

As in the current study, blurred and sweeping perception, unplanned, impulsive and unsystematic exploratory behaviour, lack of precision and accuracy, impaired use of two or more sources of information and lack of planning behaviour also emerged as the most likely cognitive difficulties experienced by students in Mehl's (1985) doctoral study. Applying the concept of enumerative induction one

could therefore surmise that there is a possibility that “at risk” students, in the absence of mediation, could experience similar problems. Drawing on Amos’s (1999) argument that students who encounter learning difficulties do not lack inherent abstract cognition and that they are potentially able to engage with higher education once they have been shown how to mobilise particular cognitive processes, the next part of the discussion will explore the role of mediation in the Intervention Programme.

7.2.3. Insights from the observational data

After the error analysis, the second part of the dissertation explored the role of mediation in the Intervention Programme with regards to the scaffolding of learning activities. Drawing on the literature (Mehl, 1985; Oon-Seng Tan, 2005; Skuy, 2002; Tribus, 2005; Tzuriel & Kaufman, 1999) this study set out to observe and describe the role of mediation in facilitating awareness of the learning process and of the didactic principles underlying it. With regards to the Intervention Programme, three learning activities were observed, using the principles of a collective case study to recognise and identify patterns. A theoretical framework, drawing on Vygotsky and Feuerstein’s mediation theories, was applied to explore whether mediation played a role in developing students into self-directed and more efficient learners once they have mastered these skills.

The three learning activities selected for the collection and analysis of data in the collective case study included a problem-based session, a small group tutorial and an Academic Literacy lecture. Different teaching and learning methodologies are inherent to each of these educational activities. One could then surmise that the task at hand from each situation would expect and demand different cognitive and metacognitive competencies from students. The sub-question asked for this part of the study therefore set about analysing data to see whether and how mediation, as a universal principle applicable to all three activities, contributed to the scaffolding of students’ learning.

Observational data indicating mediation during teaching and learning activities

In this part of the analysis observational data were analysed to investigate what mediation techniques were used in the different teaching scenarios. In all three teaching and learning activities questions played a key role. Drawing on research by Hardman and Ng'ambi (2003) I observed how lecturers in this study also used questions as a tool to understand the gap between what the student knows and needs to know. Open-ended questions specifically triggered more reflective thinking with regards to the purpose of the activity. Once students grasped the intent of the activity, they found it easier to identify and define the problem or task at hand. The lecturers also used questions to focus students' attention on key issues, as opposed to random information. That is, questions were used to mediate intentionality and reciprocity.

By reproducing this activity in three different learning settings, one could surmise that through mediation students were in a better position to develop and strengthen critical thinking skills and to transfer skills to other learning situations. Transfer was further strengthened by all three lecturers constantly linking the current learning experience with previous and other learning experiences and materials, such as textbooks. All three lecturers also made constant reference to the role of the learning activity in the students' overall MBChB curriculum. Students therefore sensed the purpose and meaning of the activity in contributing towards their development in becoming doctors.

To address cognitive difficulties with regards to unplanned behaviour, all three activities constantly encouraged students to apply a systematic approach and to communicate their responses coherently. In the small group tutorial and PBL sessions the lecturers' questions and comments encouraged students to understand the work, as opposed to simply regurgitating it, hence addressing the issue of meaningless rote learning. Students were asked to hypothesise, apply and synthesise the learning material and therefore given opportunities to develop and strengthen their problem solving abilities. When students got tangled up in irrelevant information, the lecturer demonstrated the use of summative behaviour.

Finally, all three lecturers scaffolded the process of linking information and relating concepts by using structured questions. Open ended questions systematically focused students' attention on relevant cues so that the process of synthesising was modeled to them.

According to Feuerstein (1991) the best way to evaluate the quality of a mediated interaction is to ask how different it was from the regular one. In mainstream these students would not have had as many opportunities to apply their knowledge in the presence of a content expert in small group situations. They would have attended a lecture⁹ on the topic, been given reading material and attended problem-based learning sessions, where the facilitator facilitated the process, not the content. Students would therefore have had to construct their own knowledge. Drawing on Vygotsky's notion of mediation, these students would not have been actively mediated by a human mediator in order to make sense of the symbolic tools. One could therefore surmise that they would not have moved from their actual level of underachievement to a level where they are performing at their potential.

Results from the study indicated that all three cases contained the three major "ingredients" of mediation. This includes behaviour to foster reciprocity, behaviour that models transcendence and behaviour associated with mediation of meaning. Drawing on Ben Hur's (1998) guidelines for mediation, results indicated that the universal techniques for creating a mediated learning experience emerged in patterns from the three observed situations.

Behaviour to foster reciprocity in students included asking "why" and "how" questions rather than "what" questions, responding to students in a non-judgmental manner, encouraging students to offer alternative ideas, listening to students and focusing students' attention on key issues. Mediating transcendence was demonstrated by lecturers drawing students' attention to the link between current and previous learning experiences, relating the learning experience with

⁹ Mainstream teaching activities are not designed to deliberately address an inability to engage with academic text.

similar situations where students could apply the same skills, knowledge and competencies. Mediation of meaning was evident in lecturers encouraging students to transfer their current learning across the curriculum and into their future careers. Students were made aware of the value of the learning situations in their own lives as well as making explicit the learning goals of the specific situation.

7.2.4. Cognitive and academic shifts

The next part of the discussion will focus on results indicating that mediation in the IP programme led to a shift in cognitive performances. Although this study is not evaluating the impact of mediation on students' performance, a qualitative analysis of pre- and post- test data was done to reflect on cognitive and academic shifts that occurred during the Intervention Programme. The role of pre-and post-test and the concept of dynamic assessment have been discussed in Chapter Three. Based on these two concepts, this study explored whether students shifted academically after an intensive mediated learning experience.

Results from the SRT pre-test clusters indicated that most of the subjects were potentially "at risk". Although certain students performed well on individual clusters of the test, the overall low scores indicated that students experienced particular difficulty with multiple conclusions, patterns, scientific language and synthesis. These results correlated with the previous discussion on semantic, disciplinary and cognitive difficulties illuminated by the error analysis. Students seemed to struggle with "objective" and "subjective" language, precision in language and the necessary tools to understand and work with claims. As was evident from the error analysis, they also experienced difficulty with the notion of multiple conclusions and the fact that there is not always a "correct" answer. The fact that they did not perform well on the "synthesis" cluster resonates with results from the error analysis and the observation of the learning activities. In the absence of mediation, students seemed to struggle with identifying the essence of the problem, or task at hand, and therefore were unable to select relevant information to process the answer.

Slightly higher scores were obtained in the “evidence”, “relationships”, “speculate” and “likelihood” cluster although these scores still predicted that students would potentially experience difficulty in these areas. Once again the same cognitive difficulties as in the error analysis arose. The dissertation would surmise that in the absence of mediation, students experienced problems when they had to select and use evidence to substantiate a claim. They do not necessarily see relationships in data and are often unable to relate different parts of the task at hand to each other. Critical and scientific reasoning skills were not applied when they had to validate a claim and they struggled with the concept of likelihood. As was mentioned earlier, if students have not developed the above-mentioned skills, they would encounter problems with the Psycho-social discipline, as the cognitive demands of this subject centre around a sound understanding of evidence, relationships, likelihood, speculation, validity of claims and multiple conclusions. Should students simply rote learn the material, as they did in the past, they will not be able to apply their knowledge and make efficient use of the theories they have learnt. If, on top of that, they have not developed and strengthened the necessary semantic competencies necessary for abstract concepts, then it is no wonder that they were underachieving.

Overall results from clusters of the PTEEP pre-test indicated that most students experienced difficulty with the “metaphor” and “relations” clusters. This would indicate that they struggled with language connotation and the ability to perceive the structure and organisation of an argument. Typically speaking this would mean that they were not always aware of the structure in the discourse to develop an argument by the logical transition from introduction to conclusion.

After a semester in the Intervention Programme students were asked to repeat the SRT and PTEEP tests. Based on the concept of dynamic assessment (Murphy & Maree, 2006; Tzuriel & Kaufman, 1999) where mediation happens in between the pre- and post-test and where the difference between pre- and post-test scores is usually an indication of ‘potential’, scores from the pre- and post- SRT and PTEEP were compared and contrasted. For both tests, scores improved.

In the SRT the biggest improvements were in the “pattern” and “likelihood” clusters, indicating that students were becoming particularly more comfortable with the concept of chance, and that they were now able to recognise patterns and taxonomy in data as opposed to what was earlier described as a blurred and sweeping perception. They showed an improvement with regards to the use of evidence to support claims, which could indicate that they were able to use and apply logical evidence as opposed to sweeping statements and speculations. The results showed that students also improved with regards to synthesising the essence of the problem at hand, and no longer seemed to apply unplanned, impulsive, unsystematic exploratory behaviour. This result could also indicate that students were able to experience the actual problem and subsequently define it. Improvement with regards to relationships in data could indicate that they were more comfortable with comparing two sources of information and that they were now able to perceive commonality and difference in data. This is an indication that their receptive verbal tools for discrimination in data improved. The initial difficulties regarding multiple conclusions also improved, showing that students were no longer hampered by restricted inferential hypothetical thinking. It seems as if their critical thinking skills improved, allowing them to arrive at more than one solution to a problem.

Results from the PTEEP also showed an improvement on all the clusters. The biggest improvement areas were in “sentences”, “metaphor” and “relations”. This indicates that students’ verbal receptive tools were strengthened so that they could understand the discourse, arguments and functions of sentences. This potentially enabled them to select relevant as opposed to irrelevant data for completing the task at hand. They were now in a better position to separate the essential from the non-essential, therefore not struggling with blurred and sweeping perceptions as before. As in the case of the SRT results, an improvement with regards to extrapolation, application and inferencing showed that students had potentially developed and strengthened the ability to use summative behaviour and to identify and apply logical evidence when solving a problem. An overall improvement in

the PTEEP also indicated that students had developed better communication skills, and were possibly no longer applying trial and error responses. By understanding the logic behind a language one could surmise that they were now in a better position to formulate elaborated, logical and coherent answers.

Comparing these results with earlier results from the error analysis, it is clear that the cognitive difficulties experienced by students before a period of intensive mediation have decreased. Drawing on Tzuriel and Kaufman (1999), one could surmise that after a period of mediation, students' performances become a better indication of their potential and prognosis of academic success. To justify this statement, an error analysis was also done after completing the first semester of the Intervention Programme. Students were given the same questions, but they had to apply them to a different case in order to assess linking and application skills. Results from the second error analysis showed a vast improvement on all fourteen errors. Students particularly improved with regards to providing evidence to justify their answers and to link concepts. Similarly they improved with regards to synthesising the essence of the problem by separating the essential from the nonessential. From a language perspective students were able to extrapolate, apply and infer as they seemed to understand the communicative function of sentences. Particularly evident was an improvement in all the students' work with regards to likelihood and multiple conclusions. Students also improved vastly with regards to validating claims as opposed to sweeping statements.

Drawing on Feuerstein's (Feuerstein et al, 1980) categories of cognitive difficulties, one could surmise that students had overcome cognitive difficulties with regards to the input, elaboration and output phase, thereby demonstrating that they are in a much stronger position now to reach their level of potential. With regards to the input phase students' work no longer came across as unplanned, impulsive and unsystematic. From their answers it appeared as if students were more able to plan their work and to apply precision and accuracy in collecting the necessary knowledge to answer the question. Very little evidence of speculation

and sweeping statements was found, indicating that students no longer approach the questions with blurred, sweeping perceptions. The fact that students were able to identify links and relationships also indicated that they had developed and strengthened the ability to compare more than one source of information at once. With regards to the elaboration phase students selected relevant as opposed to irrelevant cues in defining the problems and were able to apply hypothetical thinking. As was mentioned above, students frequently made use of logical evidence when validating a claim. With regards to the output phase students' work no longer reflected trial and error responses, as their answers were elaborated, coherent and precise. All of the above lead to better performance, and one could therefore surmise a better understanding of the cognitive demands of the Psycho-social discipline.

7.2.5. Insights from the interviews

The third portion of the thesis explored how students viewed the role of the Intervention Programme in strengthening their academic performance. Structured interviews were used to gather data with regards to students' experience of the programme. Three overall patterns emerged from the data. Students spoke openly about difficulties that hampered their performance in mainstream semester one. From their responses it was evident that, apart from the workload, they often did not understand the intentionality of activities such as PBL. They were therefore unable to apply their critical thinking and problem-solving abilities, as they had no perception of the required learning style. Students reported that they still used rote-learning techniques, and were therefore unable to relate and apply knowledge. Being second language English speakers, they commented on difficulties with expressing themselves verbally in learning situations, and as a result often withdrew from discussions, or did not seek help from lecturers. Students also expressed their frustration at not being able to grasp the academic literacy needs necessary for coherent and logical answers, specifically with regards to the Psycho-social module. Patterns emerging from students' perception of the role of the programme on their performance showed that mediation played a significant role in restoring students' motivation levels, as they could sense the

purpose of learning activities. They were shown the didactic principles behind PBL, tutorials and lectures and were given guided opportunities to improve their cognitive skills. As a result their performances improved, which motivated them to participate constructively in all the learning activities. Students also commented on regaining their confidence once they understood the meaning of activities. They were made aware of how activities were chosen to mould them into their roles as future doctors, and therefore realised that they were still part of the curriculum, and that their dreams could still be realised. Comments relating to transcendence were evident from students describing how they now understood how different parts of the course related to one another, and how they could transfer their skills from Academic Literacy to PBL to a Psycho-social tutorial. All in all students commented on having developed a deeper understanding of the learning process.

7.2.6. Non-academic factors

This study explored the role of mediation in addressing cognitive and semantic difficulties in unsuccessful performance at tertiary level. However, as was mentioned in the literature review, other “non-academic” factors could also impact on students’ performances (Bangeni & Kapp, 2005; Leibowitz et al, 2006; Mokgokong, 2007). It is therefore possible that these factors contributed to students’ motivation levels before and after the Intervention Programme, and eventually resulted in them performing at a certain level. Drawing on Feuerstein’s (Feuerstein et al, 1980) category of affective-motivational factors, results from this study indicated that motivation was identified by students as a key factor determining their performance. Students reported that their motivation levels increased considerably once they joined the Intervention Programme.

7.2.7. In summation

In answering the research question posed at the beginning of the study, one could argue that various factors impacted on the improved results, specifically the fact that students revisited material covered in semester one of the mainstream course. However, drawing on Kies and Freund’s (2005) research (Chapter Three) indicating that first year medical students with academic difficulties who enter an

intervention programme outperform and spend less time to complete the curriculum than those students who fail and simply repeat the first year, one can deduce that the mediated teaching and learning activities of the Intervention Programme must have contributed to the improvements. Key findings in the dissertation indicated that all the participants demonstrated “at risk” academic behaviour before they entered the programme. A deeper analysis of the “at risk” factors showed that cognitive and academic difficulties contributed to their underachievement. The study also showed that students shifted towards performing at their potential level of development in test performances during the programme. Observational data indicated that mediation played a key role in the various scaffolded learning and teaching activities. Drawing on Vygotsky’s notion of mediation (1978), one could therefore surmise that human mediators in the programme opened up students’ ZPD by getting them to engage constructively with learning material, and therefore overcoming their initial academic and cognitive difficulties.

7.3. LIMITATIONS OF THE STUDY

This descriptive study focussed on educationally disadvantaged first year medical students at UCT, and could therefore not be generalised to comment on the role of mediation at any given tertiary institution. The sample size was very small, so quantitative measures could not be used to gain profound insight into cognitive shifts that occurred during the programme. This study could only surmise from a descriptive point of view why the changes occurred, and not use a t-test to explore the statistical differences of the means of the pre-and post-tests. Because of the positioning of the Intervention Programme in the MBChB curriculum at UCT, a control group could not be identified to do a case-control study in order to compare the difference between students who entered the programme and those who did not. It is also possible that demographic factors, familiarity with the course content and personality factors influenced students’ response to the programme. The teaching styles of lecturers in the Intervention Programme reflect a more compassionate and intimate approach, which could have influenced students’ willingness to engage with the learning material.

7.4. RECOMMENDATION FOR FURTHER STUDIES

This research has shown how mediation functions in an Intervention Programme and points to the potential significant impact this kind of programme has. The next step would be to do an impact study of the role of the Intervention Programme on students' performance once they return to mainstream to ascertain whether students continue to perform satisfactorily and whether they continue to apply skills taught to them in the Intervention Programme.

To verify results, a study involving a different educational setting could be done; for example, the researcher could investigate whether a foundation programme would generate the same results. The researcher could compare results from a foundation course with the current results in order to investigate the foundational and critical components of any support programme to facilitate the process from underachievement to satisfactory performance. Results from such a study could also shed light on the role of mediation in any teaching environment.

A similar study could also be done with students who are not from educationally disadvantaged areas, to investigate whether mediation had an impact on their performance as well; in other words, to explore the different "distances" that students move in the ZPD. Action research could also be applied to investigate the role of symbolic tools used in the Intervention Programme to facilitate learning.

7.5. CONCLUSION

In building a logical chain of evidence one can again apply the concept of inductive enumeration to examine the possibility of mediation contributing towards cognitive and academic shifts. In this study typical errors made in Psycho-social scripts were analysed and linked to existing cognitive categories describing several cognitive difficulties. The linking of Feuerstein's categories to an error analysis is novel and represents an achievement of this dissertation. The difficulties identified from the error analysis decreased significantly once lecturers started to mediate the learning process. Mediation of intentionality

and reciprocity, meaning and transcendence happened via open-ended structured questions to specifically address the cognitive difficulties experienced by students. Students responded positively once they were shown what the intent of the learning situations was, once they could find meaning in the learning activities and once they were shown how to apply their newly acquired specific skills and knowledge in general contexts. Results from the data analysis showed how problem-solving skills, critical thinking and semantic competencies were scaffolded via the process of mediation. Lecturers intervened at critical moments to make students aware of the learning process; thereby developing their metacognition and steering them away from a potential culture of rote-learning. Scores from two cognitive tests administered and analysed after six months in the programme indicated that students were no longer “at risk” and that their cognitive abilities strengthened significantly. The same results were echoed in a second error analysis performed at the end of the first semester. Quantitative data thus suggest that shifts occurred over the period of the Intervention Programme to strengthen students’ ability to engage with academia. Results indicating that the various teaching activities in the Intervention Programme incorporate mediation as a pedagogical strategy provide evidence that mediation, as a developmental strategy, offers a strong explanation for why students’ academic engagement improved over the course of the programme.

Medical education in South Africa expects students to become autonomous and self-directed learners. Feuerstein (Feuerstein and Feuerstein, 1991) states that mediation leads to an awareness of the learning process and subsequently develops metacognitive skills. This enables students to become more efficient and autonomous learners. With regards to the Intervention Programme, one could surmise that the study provided evidence that mediation plays a significant role in developing and strengthening cognitive and academic skills necessary for successful performance in a first year MBChB course. The contribution of this dissertation was therefore to provide a framework for studying the role of mediation in teaching and learning activities designed to address underachievement.

REFERENCES

- Adler P.A. & Adler P. 1994. Observational techniques. (In Denzin, N.K. & Lincoln, Y.S. (eds.), *Handbook of Qualitative Research*. London: Sage. p. 377-392.)
- Alexander, R.L., Badenhorst, E..S. & Gibbs, T. 2005. Intervention Programme: a supported learning programme for educationally disadvantaged students. *Medical Teacher*, 27(1): 66-70.
- Amos, TL. 1999. Integrating the development of academic literacy into mainstream teaching and learning. *South African Journal of Higher Education*, 13(3): 177-185.
- Bangeni, B. & Kapp, R. 2005. Identities in transition: Shifting conceptions of home among "Black" South African University students. *African Studies Review*, 48(3): 1-19.
- Bannon, L., & Bodker, S. 1991. Beyond the Interface: Encountering Artefacts in use. (In Carroll. J.M. (eds.), *Designing Interaction: Psychology at the Human-Computer Interface*. Cambridge: Cambridge University Press. p. 227-253.)
- Bateson, G. 1972. *Steps to an Ecology of Mind*. New York: Ballantine Books.
- Ben-Hur, M. 1998. Mediation of cognitive competencies for students in need. *Phi Delta Kappan*, 79(9): 661-666.
- Berger, K. 2005. *The Developing person: through the life span*. New York: Worth Publishers.
- Boughey, C. 2007. Educational development in South Africa. From social reproduction to capitalist expansion? *Higher Education Policy*, 20(1): 5-18.

Boyd, F.B. 2000. The cross-aged literacy program: Developing meditational activity to assist ninth-grade African-American students who struggle with literacy learning and schooling. *Reading and Writing Quarterly*, 16(4): 381-398.

Breier, M. & Wildschut, A. 2006. *Doctors in a Divided Society*. Cape Town: Health Science Research Council Press.

Bromley, D.B. 1990. Academic contributions to psychological counselling: A philosophy of science for the study of individual cases. *Counselling Psychology Quarterly*, 3(3): 299-307.

Burch, V.C., Sikakana, C.N.T., Yeld, N., Seggie, J.L. & Schmidt, H.G. 2006. Performance of academically at-risk medical students in a problem-based learning programme: A preliminary report. *Advances in Health Science Education*, 12(3): 345-358.

Chaplin, S. 2007. A model of student success: Coaching students to develop critical thinking skills in introductory biology courses. *International Journal for the Scholarship of Teaching and Learning*, 1(2): 1-7.

Cliff, A.F. & Hanslo, M. 2005. The use of 'alternate' assessments as contributors to processes for selecting applicants to Health Sciences Faculties. *Proceedings of the 2005 Conference of the Association for Medical Education in Europe (AMEE)*, Amsterdam, 30 August - 2 September, 2005. p. 190.

Colliver, J. 2000. Effectiveness of problem-based learning curricula. *Research and Theory Academic medicine*, 75(3): 259-266.

Craig, A.P. 2001. Education for All. *South African Journal of Education*, 10(2): 47-55.

Cummins, J. 1996. *Negotiating identities: education for empowerment in a*

diverse society. Ontario, CA: California Association for Bilingual Education.

Davidowitz, B. & Rollnick, M. 2003. Enabling metacognition in the laboratory: A case study of four second year university Chemistry students. *Research in Science Education*, 33(1): 43-69.

Davydov, V. 1999. The content and unsolved problems of activity theory. (In Engestrom, Y., Miettinen, R. & Punamaki, R. (eds.), *Perspectives on activity theory*. Cambridge, UK: Cambridge University Press. p. 39-53.)

De Klerk, E., Van Deventer, I. & Van Schalkwyk, S. 2006. Small victories over time: the impact of an academic development intervention at Stellenbosch University. (*Research document*).

Denzin, N. 1970. Strategies of multiple triangulation. (In Denzin, N. (eds.), *The research act in sociology: a theoretical introduction to sociological method*, New York: McGraw-Hill. p. 297-313.)

Denzin, N.K. 1970. *The research act: a theoretical introduction to sociological methods*. New York: McGraw-Hill.

Denzin, N.K. & Lincoln, Y.S. (eds). 1994. *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage Publication.

Du Plessis, L.A., Janse van Rensburg, G. & Van Staden, C.J. 2005. Realities of a foundation programme implemented as a vehicle to align learners cognitively for entry into a national diploma in information and communication technology. *South African Journal of Higher Education*, 19(5): 863-879.

Dweck, C.S. 1986. Motivational processes affecting learning. *American Psychologist*, 41(10): 1040-1048.

Eiselen, R. & Geyser, H. 2003. Factors distinguishing between achievers and at risk students: a qualitative and quantitative synthesis. *South African Journal of Higher Education*, 17(2): 118-130.

Elder, L. & Paul, R. 1994. Critical thinking: Why we must transform our teaching. *Journal of Developmental Education*, 18(1): 34-35.

Ennis, R.H. 1968. Enumerative Induction and best explanation. *Journal of Philosophy*, 65(18): 523-529.

Feuerstein, R. & Feuerstein S. 1991. Mediated Learning Experience: A Theoretical Review. (In Feuerstein, R., Klein, P.S., Tannenbaum, A.J.(eds.), *Mediated learning experience (MLE): theoretical, psychosocial and learning implications*. Tel Aviv and London: Freund Publishing House. p. 3-51.)

Feuerstein, R., Klein, P. & Tannenbaum (eds). 1991. *Mediated learning experience (MLE): theoretical, psychosocial and learning implications*. Tel Aviv and London: Freund Publishing House.

Feuerstein, R., Rand, Y., Hoffman, M. B. & Miller, R. 1980. *Instrumental enrichment: an intervention programme for cognitive modifiability*. Glenview, IL: University Park Press.

Flyvbjerg, B. 2006. Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2): 219-245.

Gandhi, N.D., Moll, A., Sturm, A.W., Pawinski, R., Govender, T., Lalloo, U., Zeller, K., Andrews, J. & Friedland, G. 2006. Extensively drug-resistant tuberculosis as a cause of death in patients co-infected with tuberculosis and HIV in a rural area of South Africa. *The Lancet*, 368(9547): 1575-580.

Hardman, J. & Ng'ambi, D. 2003. A questioning environment for scaffolding learners' questioning engagement with academic text: a university case study. *South African Journal of Higher Education*, 17(2): 139-146.

Hardman, J. 2005. Activity theory as a potential framework for technology research in an unequal terrain. *South African Journal of Higher Education*, 19(2): 378-392.

Harland, T. 2003. Vygotsky's Zone of Proximal Development and problem based learning: Linking a theoretical concept with practice through action research. *Teaching in Higher Education*, 8(2): 263-272.

Health Professional Council of South Africa Medical and Dental Professional Board. 2002. *Regulations relating to the registration of students' undergraduate curricula, and professional examination in medicine*. Pretoria: HPCSA Press.

Hodder, I. 1994. The Interpretation of Documents and Material culture. (In Denzin, N.K. & Lincoln, Y.S (eds.), *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage Publication. p. 393-402.)

Iputo, J.E., & Kwizera, E. 2005. Problem-based learning improves the academic performance of medical students in South Africa. *Medical Education*, 39(4): 388-393.

Janesick, V. J. 1994. The dance of qualitative research design. Metaphor, Methodolatry and Meaning. (In Denzin, N.K. & Lincoln, Y.S (eds.), *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage Publication. p. 379-399.)

Jorgensen, D.L. 1998. *Participant observation*. Newbury Park, CA: Sage Publications.

Kaniel, S., Tzuriel, D., Feuerstein, R., Ben-Schachar, N. & Eitan, T. 1991. Dynamic assessment: Learning and Transfer Abilities of Ethiopian Immigrants to Israel. (In Feuerstein, R., Klein, P. & Tannenbaum, A. (eds.), *Mediated Learning Experience: Theoretical, Psychosocial, and Learning Implications*. Tel Aviv and London: Freund Publishing House. p. 179-212.)

Kies, S.M. & Freund, G.G. 2005. Medical students who decompress during the M-1 year outperform those who fail and repeat it: A study of M-1 students at the University of Illinois College of Medicine at Urbana-Champaign 1988 –2000. *BMC Medical Education*, 5(1): 18-23.

Kimchi, J., Polivka, B. & Stevenson, J.S. 1991. Triangulation: Operational definitions. *Nursing Research*, 40(6): 364-366.

Klein, P.S. 1991. Molar assessment and parental intervention in infancy and early childhood: New Evidence. (In Feuerstein, R., Klein, P. & Tannenbaum, A. (eds.), *Mediated Learning Experience: Theoretical, Psychosocial, and Learning Implications*. Tel-Aviv and London: Freund Publishing House. P. 213-240.)

Kozulin, A. 1990. *Vygotsky's Psychology. a biography of ideas*. New York: Harvester Wheatsheaf.

Kozulin, A. 2002. Sociocultural Theory and the mediated learning experience. *School Psychology International*, 23(1): 7-35.

Lehmann, U., Andrews, G. & Sanders, D. 2002. *Change and innovation at South African Medical Schools - An Investigation of Student Demographics, Student Support and Curriculum Innovation I*. Durban: Health Systems Trust Research Programme.

Leibowitz, B.L., Booie, K., Daniels, S., Loots, A., Richards, R. & Van Deventer, I. 2006. The use of educational biographies to inform teaching and learning in an

African university. *South African Journal of Higher Education*, 19(Special Edition): 1220-1237.

Lincoln, Y.S. & Guba, E.G. 1985. *Naturalistic inquiry*. Beverley Hills CA: Sage.

Luria, A.R. 1976. *Cognitive development: its cultural and social foundations*. Cambridge: Harvard University Press.

Macdonald, C.A. 2006. The Properties of mediated action in three different literacy context in South Africa. *Theory Psychology*, 16(1): 51-80.

Mathews, M., Glencross, M.J. & Kentane, H. 2000. Conceptual integration of some basic concepts in Physics and Chemistry among Science foundation year students. *South African Journal of Higher Education*, 14(1): 160-165.

McMillan, W.J. 2005. "We are not in the least bit used to these ways of studying": Developing academic competence in all students. *Journal of Dental Education*, 69(10): 1123-1132.

Mehl, M.C. 1985. *The Cognitive Difficulties of First Year Physics Students at the University of Western Cape and Various Compensatory Programs*. Cape Town: University of Cape Town. (Doctoral thesis).

Mehl, M.C. 1988. Academic support: developmental giant or academic pauper? *South African Journal of Higher Education*, 2(1): 17-20.

Mehl, M.C. 1991. Mediated learning experience at university level – A case study in Mediated Learning Experience (MLE). (In Feuerstein, R., Klein, P. & Tannenbaum, A. (eds.), *Mediated Learning Experience: Theoretical, Psychosocial, and Learning Implications*. Tel-Aviv and London: Freund Publishing House. p.157-178.)

Miles, M.B. & Huberman, A.M. 1994. *Qualitative Data Analyses: an expanded sourcebook*. London: Sage Publications

Mitchell, E.S. 1986. Multiple triangulation: A methodology for nursing science. *Advances in Nursing Science*, 8(3): 18-26.

Mokgokong, M.P.T. 2007. *The provision of remedial academic support to first year dental therapy students at Medunsa*. Pretoria, UNISA. (Masters dissertation)

Moll, L.C. 1990. *Vygotsky and Education: instructional implications and applications of Socio-historical Psychology*. Cambridge: University Press.

Moore, R. 1998. How science educators construe student writing. (In Angelil-Carter, S. (eds.), *Access to Success: Literacy in Academic Contexts*. Cape Town, University of Cape Town Press. p. 83-102.)

Moore, R., Paxton, M., Scott, I. & Thesen, L. 1998. Language development initiatives and their policy contexts. (In Angelil-Carter, S. (eds.), *Access to Success: Literacy in Academic Contexts*. Cape Town: University of Cape Town Press. p. 8-20.)

Morrison, J. 2004. Where now for problem based learning? *The Lancet*, 363(9403): 174-174.

Mosito, C.P. 2006. *Cognitive change in out-of-school learners in a Western Cape intervention programme*. Cape Town: University of Cape Town. (Doctoral thesis).

Moulder, J. 1991. Remedial education programmes: miracle or failure? *South African Journal of Higher Education*, 5(1): 5-10.

Murphy, R. & Maree, D.J.F. 2006. A review of South African research in the field of dynamic assessment. *South African Journal of Psychology*, 36(1): 168-

Neuman, W.L. 1994. *Social Research Methods: qualitative and quantitative approaches*, MA: Allyn and Bacon.

Onsongo, W.M. 2006. Assessing the impact of academic support: University of the Witwatersrand. *South African Journal of Higher Education*, 20(2): 273-287.

Oon-Seng, T. 2006. Development of a thinking programme for engineering students. *Innovations in Education and Teaching International*, 43(3): 245 -259.

Parkinson, J., Jackson, L., Kirkwood, T. & Padayachee, V. 2007. A scaffolded reading and writing course for foundation level science students. *English for Specific Purposes*, 26(4): 443-461.

Patton, M. Q. 1980. *Qualitative evaluation methods*. Beverly Hills, CA: Sage Publications.

Paul, R., & Elder, L. 1994. Critical thinking: Why we must transform our thinking. *Journal of Developmental Education*, 18(1): 34-35.

Paxton, M. 1995. Tutor responses to student writing. *South African Journal of Higher Education*, 9(1): 189-198.

Paxton, M. 1998. Transforming assessment practices into learning processes. (In Angelil-Carter, S. (eds.), *Access to Success: Literacy in Academic Contexts*. Cape Town: University of Cape Town Press. p.136 -158.)

Paxton, M. 2003. Ways in which students gain access to university discourses: The intersection of the academic curriculum with student voices. (In Prichard, C. & Trowler, P. (eds.), *Editors, Realizing qualitative research into higher education*. , Aldershot: Ashgate Publishers. p. 21–39.)

Perkins, D., Simmons, R & Tishman, S. 1990. Teaching Cognitive and Metacognitive Strategies. *Journal of Structural Learning*, 10(4): 285-303.

Pettifor, A.E., Rees, H.V., Kleinschmidt, I., Steffenson, A.E., MacPhail, C., Hlongwa-Madikizela, L., Vermaak, K. & Padian, N.S. 2005. Young people's sexual health in South Africa: HIV prevalence and sexual behaviors from a nationally representative household survey. *AIDS*, 19(14): 1525-1534.

Piaget, J. 1955. *The Language and thought of the Child*. New York: Meridan Books.

Piaget, J. 1983. Piaget's theory. (In Mussen, P. (eds.), *Carmichael's Handbook of Child Psychology*. New York: Wiley. p. 703-732.)

Pile, K. & Smythe, A. 1999. Language in the human and social classroom. (In Taylor, N. and Vinjevold, P. (eds.), *Getting learning right: Report of the President's Education Initiative Project*. Johannesburg: Joint Education Trust. p. 314-317.)

Polit, D.F. & Hungler, B.P. 1995. *Nursing research: principles and methods* (6th ed.). Philadelphia: Lippincott.

Prince, R., Frith, V. & Jaftha, J. 2004. Mathematical literacy of students in first year of Medical school at a South African university. *Proceedings of the 12th annual conference of Southern African Association for Research in Mathematics, Science and Technology Education (SAARMSTE)*, Cape Town, 13 - 17 January 2004.

Ragin, C.C. 1978. *The comparative method: moving beyond qualitative and quantitative strategies*. Berkley: University of California Press.

Rand, Y. 1991. Deficient Cognitive Functions and non-cognitive determinants – An Integrating Model: Assessment and Intervention. (In Feuerstein, R., Klein, P. & Tannenbaum, A. (eds.), *Mediated Learning Experience: Theoretical, Psychosocial, and Learning Implications*. Tel-Aviv and London: Freund Publishing House. p. 71-93.)

Rogoff, B. 1990. *Apprenticeship in thinking*. New York: Oxford UP.

Sayer, M., De Saintonge, M.C., Evans, D. & Wood, D. 2002. Support for students with academic difficulties. *Medical Education* 36(1): 643–650.

Schmidt HG. (1983). Problem-based learning: rationale and description. *Medical Education*, 17(1): 11–16.

Seifert, T.L. 2004. Understanding student motivation. *Educational Research*, 46 (2): 137-149.

Sewell, T.W. & Price, V.D. 1991. Mediated learning experience: Implications for achievement motivation and cognitive performance in low socio-economic and minority children. (In Feuerstein, R., Klein, P. & Tannenbaum, A. (eds.), *Mediated Learning Experience: Theoretical, Psychosocial, and Learning Implications*. Tel-Aviv and London: Freund Publishing House. p. 157-178.)

Shay, S. & Moore, R. 2002. Roles under construction: The intersection of writing agency and task design in South Africa. (In Russell, D & Foster, D (eds.), *Writing and Learning in Cross-National Perspectives: Transitions from Secondary to Higher Education*. New Jersey: Lawrence Erlbaum Associates. p. 272-318.)

Silverman, D. 2001. *Interpreting Qualitative Data: methods for analysing talk, text and interaction*. London: Sage Publications.

Singaram, V. Personal interview. November, 2006.

Singh, P. 2000. Quality assurance in higher education. *South African Journal of Higher Education*, 14(2): 5-7.

Skuy, M. 2002. The Development of MLE-based Intervention Programmes in the Context of Education in South Africa. *School of Psychology International*, 23(1): 85-127.

Skuy, M., Young, S., Ajam, A., Fridjhon, P & Lomofsky, L. 2006. Instrumental Enrichment as a vehicle for teachers in implementing outcomes based education in South Africa. *International Journal of Special Education*. 16(2): 1-15.

Slabbert, J.A. & Gouws, D.G. 2006. The quest for powerful learning environments in higher education. *South African Journal of Higher Education*, 20 (2): 336-351.

Slonimsky L & Shalem Y. 2004. "Pedagogic responsiveness for academic depth". *Curriculum Responsiveness: Case Studies in Higher Education*. Pretoria: South African Universities Vice Chancellors Association: 81-99.

Smith, L & Edwards, L. 2007. A multivariate evaluation of mainstream and academic development courses in first-year Microeconomics. *South African Journal of Economics*, 75(1): 99-117.

Stake, R.E. 1994. Case Studies. (In Denzin, N.K. & Lincoln, Y.S (eds.), *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage Publication. p. 236-247.)

Stake, R.E . 1995. *The art of case study research*. Thousand Oaks, CA: Sage Publication.

Strohm Kitchener, K. 1983. Cognition, metacognition and epistemic cognition. A three level model of cognitive processing. *Human Development*, 26(1): 222 -232.

Tharp, R.G. & Gallimore, R. 1988. *Rousing minds to life: teaching, learning and schooling in social context*. Cambridge : Cambridge University Press.

Thurmond, V.A. 2001. Triangulation in nursing research: issues of conceptual clarity and purpose. *Journal of Nursing Scholarship*. 33(3): 253-258.

Tribus, M. 2005. Some Remarks on the Improvement of Engineering Education. *Journal of Science Education and Technology*, 14(1): 1-28.

Tzuriel, D 1991. Cognitive Modifiability, Mediated Learning Experience and Affective Motivational Processes: A Transactional Approach. (In Feuerstein, R., Klein, P. & Tannenbaum, A. (eds.), *Mediated Learning Experience: Theoretical, Psychosocial, and Learning Implications*. Tel-Aviv and London: Freund Publishing House. p. 95-120.)

Tzuriel, D. & Kaufman, R. 1999. Mediated learning and cognitive modifiability: Dynamic Assessment of young Ethiopian Immigrants to Israel. *Journal of Cross Cultural Psychology*, 30(3): 359-381.

Van der Veer, R. & Valsiner, J. 1991. *Understanding Vygotsky: a quest for synthesis*. Cambridge: Blackwell Publishers.

Van Schalkwyk, S. Personal communication, November 2007.

Verenikina, I. 2003. Understanding Scaffolding and the ZPD in Educational Research. *Proceedings of the 2003 AARE Conference*, Auckland, 30 November 2003. Unpublished paper.

Viamontes, G.I., Beitman, B.D., Viamontes, C.T. & Viamontes, J.A. 2005. Neural circuits for self-awareness. (In: Beitman B.D & Nair J. (eds.), *Self-Awareness Deficits in Psychiatric Patients*. New York, NY: WW Norton. p. 24-111.)

Volbrecht, T. 2003. The story of South African development in international perspective: have we lost the plot? *South African Journal of Higher Education*, 17(3): 110-17.

Vygotsky, L. 1978. *Mind in Society*. Cambridge, MA: Harvard University Press.

Wertsch, J V. 1991. *Voices of the mind: a sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.

Wood, D., Bruner, J. & Ross, G. 1976. The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17(1): 89-100.

Wood, L.A., Lithauer, P. 2005. The 'added value' of a foundation programme. *South African Journal of Higher Education* 19(5): 1002-1019.

Wood, T. 1998. Issues relating to the cognitive development of students at historically disadvantaged institutions. *South African Journal of Higher Education*, 12(1): 87-94.

Yeld, N. 2001. Assessment, equity and language of learning : key issues for higher education selection in South Africa. Cape Town: University of Cape Town. (Doctoral thesis).

Yeld, N. & Haeck, W. 1997. Educational Histories and Academic Potential: can tests deliver? *Assessment and Evaluation in Higher Education*, 22(1): 5-16.

Yin, R.K. 1984. *Case Study Research; Design and Methods*. Applied Social Research Methods Series. Vol 5. Thousand Oaks, London: Sage Publications.

Yin, R.K. 1991. *Applications of case study research*. Washington, D.C: Cosmos Corporation.

Yin, R.K. 1994. *Case study research: design and methods*. 2nd ed. Newbury Park, CA: Sage Publications.

Zaaiman, H., Van der Flier, H. & Thijs, G.D. 2001. Dynamic testing in selection for an educational programme: Assessing South African Performance on the Raven Progressive Matrices. *International Journal of Selection and Assessment*, 9(3): 256-269.

Zucker, D.M. 2001. Using case study methodology in nursing research. *The Qualitative Rapport*, 6(2): 1-6.

University of Cape Town

APPENDIX I: EXAM PAPER

**UNIVERSITY OF CAPE TOWN
FACULTY OF HEALTH SCIENCES**

**“LIFE CYCLE” [HUB1006F]
ASSESSMENT 4**

DATE : 01ST JUNE 2006
TIME : THREE HOURS
VENUE : CLARENDON HALL OF RESIDENCE

SECTION C

1. Outline the emotional experiences (psychological) that Michelle may be experiencing during her pregnancy.
6 marks
2. Outline the nature-nurture debate by explaining how each would view gender differences.
3 marks (approx. 80 words)
3. Outline the sociocultural theory and the epigenetic theory of gender development. Now explain the difference between these two theories.
5 marks (approx. 100 words)
4. Outline the sequence of language development in early childhood
3 marks (approx. 80 words)
5. Using the case, explain Harry’s parenting style. Now explain the effect that this type of parenting can have on a child.
4 marks
6.
 - a) Define coping in terms of stress
1 mark
 - b) Explain four healthy (4) ways in which Harry could cope with stress. **8 marks**

APPENDIX I cont.

7. Explain **four (4)** developmental tasks that face Harry and Kate during their middle age. **4 marks.**
8. Identify and explain one (1) work hazard faced by Harry in his work environment and one (1) work hazard faced by Kate in her work environments. **4 marks**
9. Explain four (4) factors which will shape how Harry will adjust to retirement.
8 marks (approx. 200 words)
10. Explain how Pumela's socio-economic status (SES) may impact on her emotional and physical wellness. **3 marks (approximately 80 words)**
11. Using the case, explain whether or not Jean is ageing successfully.
8 marks (approximately 200 words)
12. Define spirituality and explain how Pam's spiritual wellness may be affecting one other dimension of wellness.
13. Using Kübler-Ross's theory explain the different stages that Jean may have followed when her husband died.
8 marks (approx. 150 words)

APPENDIX II: CONSENT FORMS

Investigator:

Ms Elmi Badenhorst
Room 2.08, Anatomy Building
Faculty of Health Sciences
University of Cape Town
Observatory 7925
Tel 021-4066336
badenhor@cormack.uct.ac.za

Dear Student

I am conducting an investigation into the role of the Intervention Programme in mediating the construction of knowledge in students who have experienced academic difficulty during semester one. This investigation will be conducted for the degree of Master of Education, full dissertation, at UCT for which I am registered and for which ethical approval has been granted. The Intervention Programme Course Convenor and staff members have been approached for their permission to part take in the research.

As part of the research I wish to record teaching and learning sessions in the Psycho-Social and Academic Literacy modules. My research focus is on identifying and describing how mediation happens in the programme, and to observe the role of the mediator. Mediation in this case can be described as the process where competent, experienced and well-intentioned lecturers assist students by “bridging the gap” between the student and the sources of stimulation from which the student must learn. The lecturer will for example select relevant information and stimuli from the learning material and change and rearrange the material in such a manner that the student can interpret it. A mediator is therefore somebody who enables and facilitates an opportunity and experience of learning.

Note that you are under no obligation to become involved. Whether you agree to participate in this study or not, it will not influence (positively or negatively) your standing, reputation or assessment results in the Intervention Programme course. Even if you agree to be in the study you are still free to withdraw at any time without any disadvantage to yourself.

"What would I have to do?"

I will sit in, observe and record PBL, Academic Literacy and Psycho-social sessions without comment or interference. This process is not an evaluation of how well or how badly students perform during these sessions, or an evaluation of the lecturer's teaching abilities. This is an honest attempt to identify and describe how and when learning happens in the programme.

Commitment to confidentiality:

This study is concerned with the process of mediation, not with any individual. The personal identity of all individuals in the recorded activities and transcripts will be protected as follows:

- Only the investigator will have the recorded data. This material will not be played or shown to others (exception below).
- My degree supervisor may need to see or listen to parts of the recordings to advise me academically or to help resolve an interpretation of the transcription. During write-up of the study, individuals' identities will not be disclosed.
- Only the investigator will transcribe the recorded data for which substitute names will be used in the transcript. Any identifying items in the transcript will be altered to protect an individual's identity.
- Quotations from the transcripts will not reveal the personal identity of any individual.
- The transcript data from the recordings using pseudonyms may need to be viewed by my supervisors and examiners if they request this.

"What's in it for me?"

Your involvement will not have any effect on your status, assessment or marks. However you may benefit from becoming more aware of how you are constructing knowledge during lectures, tutorials and practicals.

On a broader scale your participation will be contributing to the growing knowledge of the Intervention Programme and thereby help to improve it for others.

I will give the group feedback on my findings.

I am prepared to answer openly any questions relating to this study or your potential involvement.

Ms Elmi Badenhorst

APPENDIX II Cont.

Investigator:

Ms Elmi Badenhorst
Room 2.08, Anatomy Building
Tel 021-4066336
badenhor@cormack.uct.ac.za

Dear Student

I am conducting an investigation into the role of the Intervention Programme in mediating the construction of knowledge in students who have experienced academic difficulty during semester one. This investigation will be conducted for the degree of Master of Philosophy (Education) – dissertation - at UCT for which I am registered and for which ethical approval has been granted.

As part of the research I wish to interview you regarding your academic background, your performance in semester one, and your impressions of the Intervention Programme.

Note that you are under no obligation to become involved. Whether you agree to participate in this study or not, it will not influence (positively or negatively) your standing, reputation or assessment results in the Intervention Programme course. Even if you agree to be in the study you are still free to withdraw at any time without any disadvantage to yourself.

Commitment to confidentiality:

This study is concerned with the process of mediation, not with any individual. Data from the interviews will be used to shed light on the role of **mediation** in the programme, and will not be used to analyse behaviour of individual students. The personal identity of all individuals in the recorded activities and transcripts will be protected as follows:

- Only the investigator will have the recorded data. This material will not be played or shown to others (exception below).
- My degree supervisor may need to see or listen to parts of the recordings to advise me academically or to help resolve an interpretation of the transcription. During write-up of the study, individuals' identities will not be disclosed.
- Only the investigator will transcribe the recorded data for which substitute names will be used in the transcript. Any identifying items in the transcript will be altered to protect an individual's identity.
- Quotations from the transcripts will not reveal the personal identity of any individual.
- The transcript data from the recordings using pseudonyms may need to be viewed by my supervisors and examiners if they request this.

"What's in it for me?"

Your involvement will not have any effect on your status, assessment or marks. However you may benefit from becoming more aware of your own academic journey and the role of IP within that journey. On a broader scale your participation will be contributing to the growing knowledge of the Intervention Programme and thereby help to improve it for others.

I will give you feedback on my findings and I am prepared to answer openly any questions relating to this study or your potential involvement.

Ms Elmi Badenhorst

APPENDIX II Cont.

Consent Form

I hereby agree to participate in the research being conducted by Elmi Badenhorst as outlined in the information letter. In particular, I agree to selected PBL session, as well as Psycho-social and Academic Literacy tutorials video-recorded for the purposes of this research.

I understand that confidentiality regarding my name and identity will be strictly upheld, and that the information gathered from me will be used as part of Elmi Badenhorst's Master Thesis research.

I am aware that participation in this study is entirely voluntary and that I may refuse to participate or withdraw at any stage without prejudicing my position as a student in the Faculty of Health Sciences.

Signature.....

Name.....

Date.....

University of Cape Town

APPENDIX II Cont.

Consent Form

I hereby agree to participate in the research being conducted by Elmi Badenhorst, as outlined in the information letter. In particular, I agree to be interviewed by Ms Badenhorst and to have the interview tape-recorded for the purposes of this research.

I understand that confidentiality regarding my name and identity will be strictly upheld, and that the information gathered from me will be used as part of Elmi Badenhorst's Master Thesis research.

I am aware that participation in this study is entirely voluntary and that I may refuse to participate or withdraw at any stage without prejudicing my position as a student in the Faculty of Health Sciences.

Signature.....

Name.....

Date.....

University of Cape Town

APPENDIX III: ACADEMIC LITERACY EXERCISE

Intervention Programme Language workshops Week 8, 3 October 2006

Reading and writing exercise

Look again at the reading on stress and your summaries/mind-maps, and answer the following questions:

1. What would you say are the authors' viewpoints about the relationship between stress and psychological and physical problems? Explain your answer. (4)
2. What do the authors think about using the word 'positive' to define stress? (2)
3. Explain and give an example of a stimulus model of stress. (4)
4. Use the interaction model of stress and the case study to analyse Dr Green's experience of and response to stress. Your answer must include a discussion of the stressors in his environment, the internal factors that might help or hinder him in coping with stress, and suggestions of what he could do to reduce stress. (10)
5. Now write a short 'essay' comparing and contrasting your own experience of and response to stress (as a student) with Dr Green's. Your answer must cover the same areas as in question 4. (10)

APPENDIX III PROTECTION AND RISK IN HEALTH

STRESS

(1999) Psychology, Sociology Applied to Medicine Churchill Livingstone

From: M. Porter, B. Adler and C. Abraham

Stress has been implicated in a wide variety of psychological and physical problems ranging from anxiety states (see pp. 112-113) to some cancers (see pp. 108-109), arthritis, heart disease (see pp. 104-105) and a greater likelihood of getting infectious diseases. Although much research links stress to many illnesses the evidence is correlational and it is extremely difficult to show cause definitively. Medical treatments and procedures, as well as pain and illness, can themselves be stressors.

WHAT IS STRESS?

The word 'stress' is used in many different ways, but it is helpful to separate the causes, 'stressors', from the responses, 'signs of stress or strain'.

Stress occurs when the demands made on a person are greater than their ability to cope. Stressors can be acute or chronic and people show great variation in their response to stressful situations. Even within an individual, responses will vary over time.

SIGNS OF STRESS

- **Biochemical:** alterations to HCTH, endorphin levels.
- **Physiological:** higher blood pressure; rapid shallow breathing.
- **Behavioural:** sleep problems; increased alcohol intake; absenteeism at work; increased errors; loss of sense of humour.
- **Cognitive:** poor concentration; poor memory; negative thoughts.
- **Emotional:** mood swings; feeling weepy; irritability.

Stress is sometimes described as positive ('a challenge') but it is less confusing to find another word (e.g. 'pressure') for this and keep 'stress' to describe a negative condition. The 'positive' aspect of pressure can be seen in Figure 1, the 'arousal curve' which shows how some pressure is needed to encourage optimum performance. It also shows, graphically, how an excess of pressure turns to stress and poor performance.

WHAT CAUSES STRESS?

Stressors can be either internal or external. Internal demands include personal expectations, attitudes and beliefs often arising from past experience,

environmental factors (such as overcrowding, see pp. 56-57), to demands from others (to be a good son/daughter), work demands (examinations) (see pp. 53-59) or the social and cultural climate (competitiveness).

Although stressors can be many and varied, there are often two important underlying characteristics of stressful situations: lack of control with a sense of helplessness in the face of events and unpredictability.



- Why might stress be considered positive?
- How does what you think contribute to stress?
- What causes stress in your life?

MODELS OF STRESS

There are a number of models of stress, of which we will consider three: one which concentrates on the physiological response, one social model which focuses on the causes of stress and the interaction model which brings the disparate parts together.

General adaptation syndrome (GAS)

This is the oldest stress model, developed by Selye in the 1940s, and is a three-stage model explaining physical stress responses.

- **Alarm stage** — the acute stage (fight or flight) when the body responds instantly to the stress. Visible signs include rapid heart rate, shallow breathing, sweating.
- **Resistance stage** — the characteristic signs of the alarm stage fade and the body appears to 'return to normal'. If the stressor persists, however,

the body continues actively to 'fight' it and the body's resources (e.g. nutrients, vitamins) are depleted.

- **Exhaustion stage** — new symptoms begin to emerge and the body becomes increasingly susceptible to illness. Although there is some evidence for the physiological changes in both animal and human studies, this model does not explain why some people respond like this, and others are unaffected by the same event.

Life change model

This model focuses on the changes, or life events, for example bereavement or marriage (Table 1), that occur in an individual's life over a given period of time. It is hypothesised that any change (positive or negative, wanted or unwanted, planned or unexpected) requires the individual to readjust to their environment and thus constitutes a stressor. A build-up of life events and constant readjustment is likely to contribute to health problems.

Life events are a common measure of stress in research, partly because the questionnaires are quick and easy to use and many correlations with illness, ranging from heart disease to cancer, depression and schizophrenia have been found. There are a number of methodological problems, however, not least the accuracy of the individual's memory for events and separating cause and effect. For example: did the divorce cause depression, or depression cause divorce, or was it a third factor, long-term unemployment, which affected both?

Table 1 Selected examples from the Holmes-Rahe Social Readjustment Rating Scale

Life event	Mean value
1. Death of spouse	100
2. Divorce	73
3. Marital separation	65
4. Jail term	63
5. Death of close family member	63
6. Personal injury or illness	53
7. Marriage	50
8. Fired at work	47
9. Marital reconciliation	45
10. Retirement	45
11. Change in health of family member	44
12. Pregnancy	40
13. Sexual difficulties	39
14. Gain of new family member	39
15. Business readjustment	39
16. Change in financial state	38
17. Death of close friend	37
18. Change to different line of work	36
19. Change in number of arguments with spouse	29

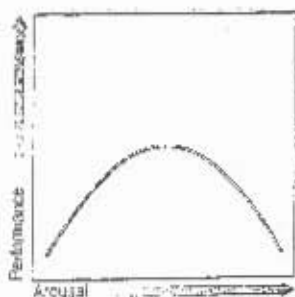


Fig. 1 The positive aspect of pressure: the

APPENDIX IV : SRT RESULTS

SRT PRE IP RESULTS

Surname	Overall	Visual	Evidence	Validity	Relationships	Synthesis	Speculate	Pattern	Multiple Conclusions	Likelihood	Language
1	31.7	58.3	36.4	27.3	36.8	30.8	0.0	7.1	30.0	0.0	17.6
2	51.7	37.5	33.3	59.1	57.9	69.2	100.0	64.3	50.0	87.5	41.2
3	45.0	41.7	42.4	54.5	52.6	38.5	20.0	42.9	50.0	62.5	35.3
4	80.0	75.0	81.8	81.8	89.5	69.2	100.0	85.7	70.0	100.0	70.6
5	28.3	37.5	36.4	31.8	26.3	15.4	40.0	7.1	10.0	0.0	35.3
6	68.3	58.3	54.5	72.7	68.4	69.2	60.0	85.7	80.0	100.0	64.7
7	66.7	54.2	60.6	81.8	71.1	69.2	100.0	64.3	40.0	100.0	70.6
8	48.3	58.3	54.5	50.0	55.3	38.5	60.0	28.6	20.0	37.5	41.2
9	53.3	66.7	63.6	50.0	68.4	46.2	40.0	28.6	50.0	37.5	23.5
10	36.7	83.3	51.5	18.2	44.7	23.1	0.0	0.0	0.0	0.0	29.4
Average	51.0	57.1	51.5	52.7	57.1	46.9	52.0	41.4	40.0	52.5	42.9

SRT POST IP1 RESULTS

Student	Overall	Cluster Visual	Evidence	Validity	Relationship	Synthesis	Speculate	Pattern	Multiple Conclusion	Likelihood	Language
1	55.0	70.8	57.6	31.8	63.2	30.8	0.0	64.3	20.0	100.0	47.1
2	58.3	45.8	39.4	68.2	65.8	76.9	100.0	71.4	70.0	87.5	41.2
3	61.7	87.5	57.6	45.5	68.4	69.2	80.0	50.0	20.0	75.0	58.8
4	65.0	62.5	60.6	68.2	65.8	53.8	20.0	71.4	50.0	100.0	70.6
5	48.3	62.5	54.5	45.5	63.2	30.8	20.0	35.7	40.0	50.0	23.5
6	75.0	75.0	60.6	81.8	78.9	92.3	100.0	78.6	70.0	100.0	70.6
7	73.3	70.8	63.6	77.3	78.9	76.9	100.0	78.6	60.0	100.0	64.7
8	68.3	75.0	57.6	50.0	71.1	61.5	40.0	85.7	70.0	100.0	52.9
9	58.3	66.7	60.6	59.1	65.8	53.8	60.0	42.9	70.0	37.5	41.2
10	50.0	45.8	45.5	63.6	44.7	53.8	20.0	42.9	40.0	62.5	70.6
Average	61.3	66.3	55.8	59.1	66.6	60.0	54.0	62.1	51.0	81.3	54.1

APPENDIX V: PTEEP RESULTS

PTEEP pre IP 1 results

Student	Overall	Vocab Cluster	Metaphor Cluster	Extrapolate Cluster	Sentences Cluster	Relations Cluster	Genre Cluster	Essential Cluster
1	53.5	55.6	0.0	40.0	33.3	59.1	33.3	54.2
2	68.6	88.9	50.0	90.0	77.8	77.3	83.3	62.5
3	36.5	11.1	0.0	60.0	55.6	9.1	50.0	79.2
4	73.0	100.0	66.7	90.0	100.0	90.9	100.0	70.8
5	30.8	55.6	0.0	40.0	55.6	9.1	16.7	37.5
6	66.0	77.8	66.7	80.0	44.4	68.2	100.0	79.2
7	73.0	100.0	83.3	70.0	100.0	86.4	83.3	79.2
8	59.7	33.3	66.7	40.0	66.7	86.4	33.3	75.0
9	42.1	66.7	50.0	70.0	55.6	9.1	66.7	54.2
10	34.6	33.3	16.7	40.0	44.4	9.1	33.3	37.5
Average	53.8	62.2	40.0	62.0	63.3	50.5	60.0	62.9

PTEEP post IP 1 results

Student	Overall	Vocabulary	Metaphor	Extrapolate	Sentences	Relations	Genre	Essential
1	66.04	77.78	50.00	70.00	77.78	72.73	50.00	75.00
2	76.7	88.9	66.7	100.0	100.0	86.4	83.3	83.3
3	59.1	88.9	66.7	70.0	88.9	36.4	50.0	62.5
4	81.1	100.0	83.3	90.0	100.0	81.8	83.3	83.3
5	40.3	44.4	50.0	60.0	66.7	9.1	50.0	41.7
6	72.3	66.7	66.7	60.0	88.9	90.9	83.3	75.0
7	75.5	100.0	66.7	80.0	100.0	90.9	83.3	83.3
8	65.4	55.6	50.0	40.0	66.7	90.9	83.3	66.7
9	62.9	88.9	66.7	70.0	100.0	81.8	66.7	62.5
10	39.0	0.0	33.3	40.0	33.3	31.8	16.7	62.5
Average	63.8	71.1	60.0	68.0	82.2	67.3	65.0	69.6

APPENDIX VI: EXAMPLES FROM SCRIPTS

(8) Kate faces ergonomic hazards. These are characterized by small or cramped working spaces and sitting at computers for long hours or doing the same thing continuously such as bending and picking fruit for long periods of time. These cause problems such as backache and sore joints. Kate has suffered from sitting at the computer too long and has been suffering of neck spasms due to this.

Psychosocial? Link

Harry faces ~~psychological~~ ~~psychosocial~~ hazards as he has to deal with stress. ~~psych~~ This is characterized by being under enormous stress which Harry is. It could lead to breakdowns and unhealthy emotional state that will affect his family as well.

(9) Financial security - If Harry is financially secure he will be able to retire ~~with~~ easier than someone who does not have money and will probably be forced into retirement. Use case!

✓
Attitude of others - If Harry is supported by his family and friends and not seen as a burden the transition into retirement will be easier. For example if his children ~~do not~~ feel as if they will be able to take care of him as repayment for all the years he took care of them he will be able to adjust well.

~~Man~~ Only 2 factors mentioned?

APPENDIX VI Cont.

1. Emotional changes: She may experience mood swings and may become withdrawn and passive and narcissistic.

Michelle might feel alone since her mother is considering taking time off work once her grandchild is born to help Michelle with the baby. There is no mention of what Michelle's husband is doing to help her or it is a possibility she is feeling alone.

①

not linked to readings on this LO.

Psychological changes:

2. This debate is about how nature ^{rather} determines ~~what~~ could influence gender differences or how nature plays a part.

This could be seen how there's no mention of Michelle's husband in helping taking care of the ~~big~~ baby. It is

assumed that women should assume ^{their} roles ~~of~~ as caregivers.

Have not explained the debate.

3. Sociocultural theory

It is mainly concerned with how society and culture influence gender development. Associating ^{or giving} certain roles to males and females. / Cultural differences.

APPENDIX VI Cont.

2. nature view gender differences is something $\frac{1}{2}$ that is learned through social enforcement nature emphasises that people develop gender differences before they were learned.

3. ^x permissive
5. Authoritative

children are more likely to be successful at school

- they become generous with other people and eager to achieve or achieve more.

0 - they grow up as happy people.

- develop a positive attitude towards life. please see model answer

G.9) coping = A strategy which people engage in order to solve their stressful demands.

b) Problem-focused

- defining the situation, generate alternatives choose between the alternatives

PROBLEM-focused

- defining the situation, generating alternatives, weighing the alternatives in terms of cost and demands and implementing the chosen alternative. - link to Harry

7a - may also be directed inwards, Harry may change certain thing about himself without changing his environment. example?

APPENDIX VII : PTEEP AND SRT CLUSTER DESCRIPTIONS

Below is a description of cognitive areas assessed by the Placement Test in English for Educational Purposes (PTEEP). Definitions are based on research done by Cliff and Hanslo, 2005:

Vocabulary

Students' abilities to derive/work out word meanings from their context

Understanding relations between parts of text

Students' capacities to 'see' the structure and organisation of discourse and argument, by paying attention – within and between paragraphs in text – to transitions in argument, super ordinate and subordinate ideas, introductions and conclusions, logical development

Separating the essential from the nonessential

Students' capacities to 'see' main ideas and supporting detail; statements and Examples, facts and opinions, propositions and their arguments, being able to classify, categorize and 'label'

Extrapolation, application and inferencing

Students' capacities to draw conclusions and apply insights, either on the basis of what is stated in texts or is implied by these texts

Understanding the communicative function of sentences

Students' abilities to "see" how parts of sentences/discourse define other parts; or are examples of ideas or are supports for arguments or attempts to persuade

Understanding text genre

Students' abilities to perceive "audience" in text and purpose in writing, including an ability to understand text register (formality/informality) and tone (didactic/informative/persuasive)

The following descriptions of cognitive areas assessed by the Scientific Reasoning Test (SRT) are based on research done by Cliff and Hanslo (2005).

Language of scientific reasoning

Understanding and assessing the language of scientific reasoning, including grappling with “objective” and “subjective” language, precision and imprecision in language, and the “measurement” of claims

Evidence to support

Using evidence to support or substantiate a claim; selecting and justifying the “best” evidence to substantiate a claim

Synthesise the essence

Synthesising the essence of a research question being probed and understanding the essence of what is of interest

Relationships in data

Identifying relationships in data or understanding how claims or evidence are related to each other

Multiple conclusions

Understanding that multiple conclusions are possible at times, in the light of the evidence that is presented, and being able to show “tolerance” of the fact that there is not necessarily one “right” answer

Validity of a claim

Assessing the validity of a claim or the evidence to support the claim, including the ability to critique a claim using scientific reasoning as the basis for the critique

Likelihood

Understanding the concept of chance, being able to assess the likelihood that an event will occur

Taxonomies or classification of data

Awareness and understanding of taxonomies or classifications in data, including being able to see super ordinate and subordinate relationships, and separate main ideas from supporting detail or examples